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AN EPITOME OF NATIONAL RECLAMATION

By C. J. BLANCHARD, *Statistician, U. S. R. S.*

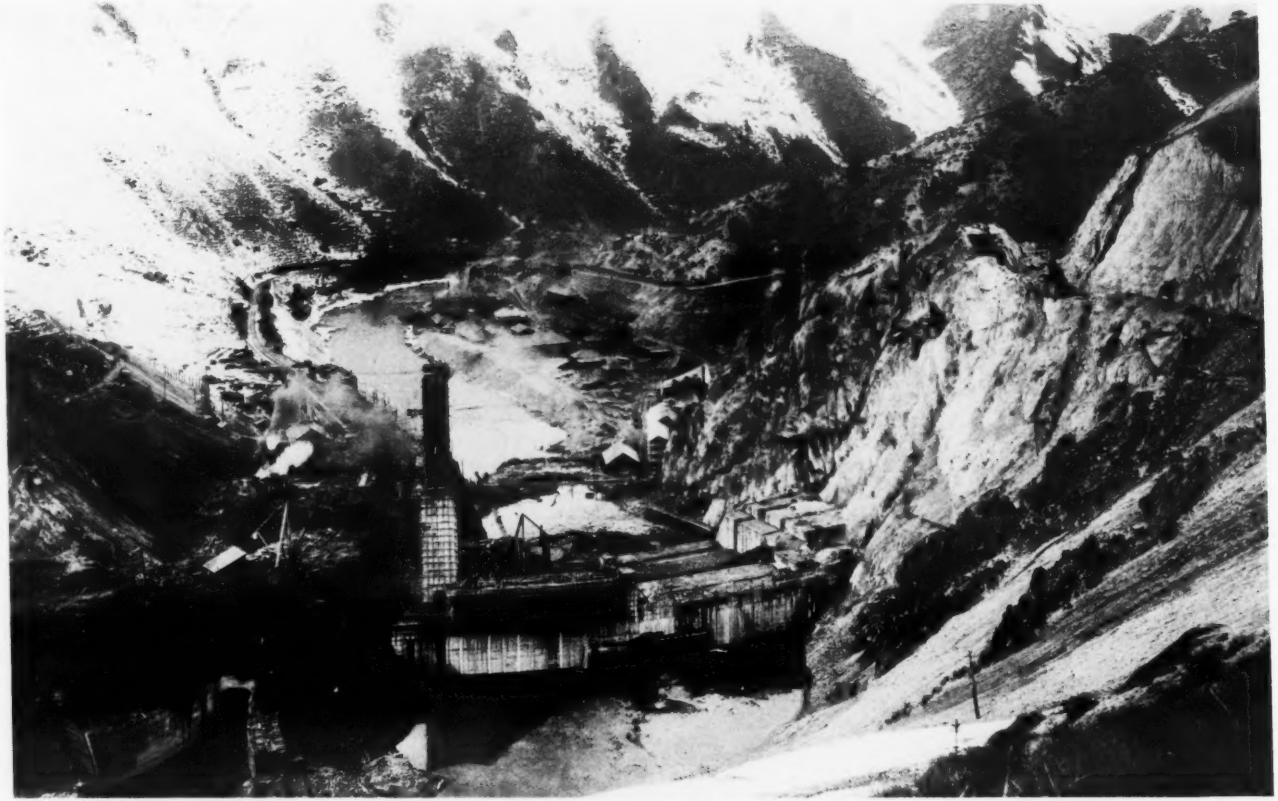
NINETEEN hundred and fourteen promises to be an exceptional year in the history of national reclamation. Secretary Lane has allotted every dollar of the Reclamation fund, amounting to $23,000,000, for the vigorous prosecution of the work. The field is so broad, however, that even with this generous outlay many urgent demands for the taking up of important work must be held in abeyance until additional funds are available. A new and encouraging factor has developed in connection with this work which has heretofore been carrried on solely under Federal auspices. Several States, notably Oregon and Washington, have evinced a laudable desire to cooperate in promoting the joint construction of irrigation projects. Oregon has appropriated a large sum of money, and the Secretary of the Interior in turn has set aside an equal amount for the investigation of possible projects on the Deschutes River and in central Oregon.

A few years ago a number of projects were undertaken by private parties who encountered vicissitudes and difficulties and finally gave up the task. Meanwhile, settlers have gone upon the land, built their homes and prepared their lands for irrigation. Their condition is serious and the States, recognizing their duty to protect the interest of these citizens, are formulating plans whereby the Service may join in completing the works. Investigations have been ordered by the Secretary and engineers are making plans to be presented to the Department at an early date.

In Washington a small appropriation has been made for a joint investigation of a large project in that State. Citizens of California have subscribed ten thousand dollars for a similar investigation in cooperation with the Government. This cooperative movement between the States and the Nation is eminently proper and has been strongly encouraged by Secretary Lane.

The failure of a number of large projects undertaken by private companies and under State supervision has given a setback to present development by private capital. From an engineering standpoint many of these projects are entirely feasible, the water supply is ample and the lands are of excellent quality. In several instances the rock upon which they were shattered has been the excessive overhead and interest charges. Such projects offer attractive opportunities for cooperative construction by State and National forces.

The Reclamation Service is now composed of a body of trained and efficient men, its machinery is highly organized, and it is prepared to do effective work at a minimum of cost. Eliminating exorbitant promotion charges, all questions of profits and the excessive expense of securing settlers, many of these projects become at once practicable and feasible and worthy of prompt completion. In each State as



THE ARROWROCK DAM.

THIS DAM IS ON THE BOISE PROJECT IN IDAHO AND WILL BE THE HIGHEST IN THE WORLD, 350 FEET. THE FOUNDATION IS FIFTY FEET BELOW THE STREAM BED AND THE TOP OF THE DAM WILL REACH TO THE SPILLWAY CUT SEEN ON THE RIGHT SIDE OF THE PICTURE.

ELEPHANT BUTTE DAM.

THIS DAM ON THE RIO GRANDE PROJECT IN NEW MEXICO WILL CREATE THE LARGEST IRRIGATION RESERVOIR IN THE WORLD. THE DAM WILL BE 300 FEET HIGH WHILE THE RESERVOIR WILL HOLD SUFFICIENT WATER TO COVER THE STATE OF CONNECTICUT TO A DEPTH OF TEN INCHES.

well as in the Service the machinery is available for the immediate placing of home-seekers upon the irrigable lands. The guarantee of a project by both State and Nation will inspire confidence, and will promote settlement by a high class of home-makers. The joint participation in the cost of the works doubles the field for the Government engineers. Whereas heretofore the attitude of the Western States has been that of "Let Uncle Sam do it," today there is a growing appreciation of the duty of the State to join forces with the Government.

The get-together spirit so strongly advocated by Secretary Lane is bearing fruit, and we may confidently look forward to a long period of joint activity in developing the latent resources of the arid West. On many of the projects yet to be taken up State lines must be eliminated and questions of State's rights must be disregarded in working out broad plans to utilize drainage basins located in several States. The field is vast and full of enormous promise to the whole nation.

Plans are being discussed today which a short time ago would have been regarded as chimerical and visionary. For example, engineers are engaged in a systematic study of available data relating to the entire drainage area of the Colorado River, our American Nile, which embraces 220,000 square miles in seven States. These plans include irrigation, power and navigation and the project is both interstate and international in character. To fructify and make available for hundreds of thousands of families a valley which in its reclaimed state would be like that of the Egyptian Nile in fruitfulness and productivity is a task well worthy of the most progressive nation on earth.

For the present year the activities of the Reclamation Service are to be centered largely upon the twenty-five great projects whereon construction has been proceeding for a number of years. It would be impossible in the space of one short article to make more than brief mention of these. A number, however, are of such magnitude and importance as to deserve special consideration.

Ranking first in probable total cost and irrigable acreage is the great Boise project of Idaho. Approximately $14,000,000 will be required to complete the work which will serve 243,000 acres of fertile land in the vicinity of Boise, Nampa and Caldwell. The engineering features of the project are exceedingly comprehensive, embracing two large storage reservoirs, three enormous storage dams, a diversion dam, power plant and transmission lines, standard-gauge railway 19 miles long, telephone lines 210 miles in length, canals 952 miles, drains 50 miles, 871 bridges, 80 buildings, 284 culverts, and 9,599 canal structures.

The most important single feature of the project is the Arrowrock dam which when completed in 1916 will be the highest in the world. This imposing structure blocks a narrow canyon of the Boise River. It is of rubble concrete, with a maximum height of 350 feet, length of crest 1,075 feet, and contents 530,000 cubic yards. Its estimated cost is $5,000,000. It will store 230,000 acre feet of water and will cover 2,780 acres about 250 feet deep. Additional storage of flood waters has been provided by the construction of two enormous earth fill dams, one of which is 70 feet high and 4,000 feet long, the other 40 feet high and 7,000 feet long, creating a lake with a capacity of 177,600 acre feet. At the Boise diversion dam the Government power plant develops 2,000 horse power, a portion of which is now utilized to actuate all machinery at the Arrowrock camp, the balance being sold to a Boise corporation.

The camp at Arrowrock, the principal terminus of the Government railway, is a community of about 2,000 souls and is entirely under the jurisdiction of the Service. It represents the most careful planning of engineers in its general layout, in the conveniences and appliances furnished for the laborers and their families. The Government runs a large mercantile store, a

THE HUNTLEY PROJECT IN MONTANA.

HERE IS A WHEAT FIELD IN SHOCK WITH THE WHEAT READY FOR THRESHING. COULD YOU GUESS THAT JUST SIX YEARS AGO THIS LAND WAS A RAW DESERT BEARING PRACTICALLY NO VEGETATION?

A River Will Run Here.

THIS EXCAVATOR IS MAKING A RIVER BED, THAT'S ALL. IN THIS BED ST. MARY'S RIVER WILL RUN FROM ITS NATURAL BED INTO MILK RUN VALLEY IN MONTANA. IT IS THE MILK RUN PROJECT.

THE TRUCKEE PROJECT.

THIS IS A PICTURE TAKEN NEAR CARSON, NEVADA. THREE YEARS AGO THIS WAS A DESERT, WHILE ON ADJOINING LAND THERE WILL BE OPENED TO SETTLERS NEXT FALL ABOUT ONE THOUSAND FARMS SIMILAR TO THIS.

big mess house feeding 600 at a meal, refrigerator and ice-making plant, hospital, dormitories, cottages, fire department, electric lighting plant, Y. M. C. A., and last but not least, a moving-picture theater. The care and provision made for the comfort and health of its men have resulted in solving in a large measure the problem of retaining competent and industrious workers, many of whom under the guidance of tactful superintendents are today depositing their earnings each pay day in the banks of Boise.

Of almost equal importance and magnitude is the Rio Grande project in New Mexico, Texas and Old Mexico. Its purpose is in a way to recreate a valley in which are found the oldest irrigation systems in the United States. Along the bloody trail made by the lustful Conquistadores of Spain, who swept northward from Mexico in search of the fabled cities of Cibola, the Government engineers are today engaged upon a work of conquest, but of a different nature. They are marking the lines of future canals which will reclaim 180,000 acres of desert. It is a region rich in historical incident, but richer in future promise of permanent and enduring prosperity. On this project the structure of absorbing interest is the great Elephant Butte dam and its huge reservoir. This dam is located about 120 miles north of El Paso and blocks the river just below the black mountain of basalt from which it takes its name. It is of rubble concrete gravity type, straight, with maximum height of 300 feet and 1,200 feet long on top. It will contain 500,000 cubic yards and will cost about $5,000.000. While not as high as the Arrowrock dam, its storage capacity is vastly greater. Behind the Elephant Butte dam is a valley containing about 40,000 acres which will become a lake more than 45 miles long. Its capacity will be 2,627,000 acre feet, making it one of the largest artificial bodies of water in the world. Its capacity will be a third greater than that of the celebrated Assuan dam in Egypt, at present the largest irrigation reservoir ever built. The Elephant Butte reservoir when full will contain enough water to cover Connecticut ten inches deep. It would fill a stand pipe ten feet in diameter reaching to the moon. It would fill 100 canals stretching from New York to San Francisco, each canal 20 feet wide and 4 feet deep.

A FRIENDLY SWAPPING OF RIVERS.

While Uncle Sam's armed forces are engaged in patrolling our Southern borders momentarily awaiting the command to cross the line to pacify the revolutionary Mexicans, on our Northwestern boundary his engineers are peacefully engaged in the pleasing pastime of swapping rivers. All is amity here and two nations are viewing the performance with every indication of friendly satisfaction.

In northern Montana two streams rise, the St. Mary draining from the lofty peaks of Glacier Park and the Milk River, which has its source on the Great Plains. Both streams flow northward into Canada, the first named finally reaching Hudson Bay. Milk River, after a short course in the United States, flows for nearly 200 miles in Canada and then returns to the United States to empty into the Missouri. Except during flood periods the Milk River is an insignificant stream. It flows through a broad and fertile valley, wanting only a dependable water supply to become one of the garden spots of the Northwest. In its valley in this country the St. Mary River has no irrigable lands, but in Canada it traverses a beautiful valley which could be reclaimed by its waters.

Our engineers conceived the idea of turning this stream by means of a canal cut through a low divide into Cutbank Creek, thence it would flow southward into Marias River and ultimately into the Missouri, irrigating en route a part of the Milk River Valley. While the scheme was feasible, it was expensive. A better plan was found, to wit, turn St. Mary River into Milk River by means of a canal 20 miles long, let the water flow through Canada and divert it later into Milk River Valley in Montana. This plan while much less costly was not practicable unless the United

A Government Coal Mine.

THIS COAL MINE THREE MILES NORTH OF WILLISTON, NORTH DAKOTA, IS OWNED BY THE UNITED STATES RECLAMATION SERVICE. IT HAS ALREADY SUPPLIED 30,000 TONS OF LIGNITE COAL TO THE GOVERNMENT POWER PLANT FROM WHICH ELECTRIC POWER IS UTILIZED TO PUMP WATER ON TEN THOUSAND ACRES OF FERTILE LAND WHILE THE SURPLUS POWER IS SOLD TO THE TOWN OF WILLISTON.

States could be assured that our Canadian brethren would not gobble up all of the flow of both streams. In view of the fact that we could keep the entire flow of the St. Mary River in our own country and that it was the more valuable of the two streams, Canada was obliging enough to enter into a treaty with the United States guaranteeing an equal division of the combined flow of both streams and giving us the right to utilize the channel of Milk River in Canada as a carrying canal for the waters we shall use in Milk River Valley, Montana. Accordingly, active work was begun on St. Mary River to impound its floods, a great canal is being excavated across the divide to wed the waters of these streams and a comprehensive canal system with numerous diversion dams is being constructed in the Milk River Valley between Glasgow and Havre. When completed nearly 200,000 acres of excellent land will be served.

The utilization of electricity developed by the Reclamation Service has become an important adjunct to the irrigation work. On several of the projects a large amount of power has been developed principally for lifting water to lands above the gravity canals. A surplus, however, has been made available for the municipalities and has been an important factor in their progress and growth. On the Minidoka project, Idaho, the power is so cheap that its use is general in the towns for lighting, heating and cooking. Recently a new school house at Rupert was fully equipped with electricity, heating, lighting, power for machinery in manual training, and heat for the cooking stoves in the domestic economy class. It is the only school house in the world so equipped. Groups of farmers are now making plans to utilize this cheap and useful force on their farms and we may soon record the fact that farm houses are lighted and heated with electricity while the housewife utilizes the same force in preparing the family meals. This seems almost inconceivable to those of us who remember this region in 1904 as a barren waste, remote from transportation and absolutely uninhabited.

On the Williston project, North Dakota, power developed from the Government's own coal mine is sold to the town of Williston. On the Strawberry Valley, Utah, and the Truckee-Carson, Nevada, projects power generated on the canals is leased to several municipalities. On the Salt River project, Arizona, a very large power development has taken place at Roosevelt dam and all the surplus power when available has been leased for a term of years to a large mining corporation at Globe. The valley towns and large manufacturing plants are being furnished a steady supply from additional plants. These power plants will probably afford an opportunity at an early date to witness an interesting experiment in communal operation of valuable public utilities with the farmer as the active agent in charge of the property.

Up to June 30, 1913, the Reclamation Service had constructed about 8,000 miles of canals, several of which carry whole rivers. It had built four of the great dams of the world. Its wagon roads have a mileage of 700, telephones 2,331, transmission lines 351, railroads 51. It has purchased 1,533,544 barrels of cement and manufactured in its own plant 433,887 barrels. The total excavation of rock and earth on that date amounted to 99,245,768 cubic yards. It employed, on an average, 7,616 men during the year. In the past season its canal systems were prepared to irrigate 1,193,374 acres and 641,397 acres were actually watered. The crop returns amounted to nearly $15,000,000 or an average of $25 per acre. The total net investment at the close of the fiscal year, June 30, 1913, was $75,174,283. The total irrigable area under present projects is slightly more than 3,000,000 acres.

Fire Losses Small

Last year the fire loss on the Canadian timber reserves was the smallest ever known, only one-fiftieth of one per cent of the area being burned over.

STREET-TREE PLANTING IN A WESTERN TOWN

By W. W. Robbins

A SHADE-TREE survey of a town on the plains of eastern Colorado was recently made. This town of some 8,500 inhabitants has 5,650 street trees. Of these, 35% are Carolina poplars, 26% are lanceleaf cottonwood, and 5% are western broadleaf cottonwood; boxelder, willows, narrowleaf cottonwood and maple-leafed cottonwood constitute another 10%, making a total of 76% undesirable, quick-growing street trees. Elms form 7% and green ash 11% of the street trees. These figures are significant; not that they indicate conditions in one western town only, but are representative of shade-tree planting throughout the plains States generally, and particularly illustrative of the widespread tendency to plant rapid-growing species. I will not say, however, that eastern and middle-western municipalities are free from censure in this regard; but it is true, perhaps, that they are taking more interest in their tree planting.

Shade-tree planting in the west is not hopelessly bad; too harsh criticism of it cannot rightly be made. It must be remembered that the west is young; towns have sprung up like mushrooms. So many questions relative to the larger improvement of the country solicit the attention of western people, that it is not to be wondered at that they have not given serious attention to shade-tree planting. However, western municipalities will, without doubt, soon come to a thoughtful consideration of their trees. In fact, Denver and Colorado Springs have taken the lead in this movement and already have accomplished much.

An easterner in conversation with a western girl remarked upon the prosperity and rapid material progress of the west, but added that "the west had not yet gotten the culture of the east." "No," was the reply, "but when we get it we will make it hum." Whether or not this illustrates the way western people do things, it is well to remember that desirable, slow-growing trees will not "hum." After the proper system of shade-tree planting is put into operation it is a long time before benefits are apparent.

Shade-tree planting in the west is still in the experimental stage; it is attended with no little difficulty. From the trees' standpoint, the variety of successful species is large; but the variety of successful and at the same time desirable trees for street planting is small. As has been indicated, the most conspicuous shade tree in all parts of the west is the cottonwood and its near relative, the Carolina poplar.

I consider that in this western country it is entirely justifiable to alternate quick-growing trees with long-lived ones, much more freely than is usually practiced in the eastern States. There is an urgent need for protection from the hot sun and high winds. One who is familiar with climatic conditions in the west, and with the manner in which it has and is being settled up, can look upon a street planted with cottonwoods with a less critical attitude.

The most general practice is to plant rapid-growers only. And again, if there is an alternation of these with longer-lived species, the former are allowed to crowd out and interfere with the normal growth of the more desirable species. It is remarkable with what tenacity an old cottonwood will be held on to! Overcrowding is practiced with a vengeance. This results from a demand for quick shade. It is not uncommon to see a double row of thirty-year-old cottonwoods along the walk, placed not more than twelve feet apart. Just as much shade could be obtained with fewer trees. Proper spacing al-

A Street Lined With Fine Oaks.

lows the tree to assume its natural spread and maintain its individuality. By crowding, the individual tree becomes unsymmetrical, and if one were to isolate such a tree from its neighbors, it would present a most unsightly appearance. It is unnecessary to sacrifice beauty for shade; it is possible to have both beauty and shade. But it will be necessary to sacrifice temporary effects and speed, if we are to have beautiful streets.

There is a large list of ornamental trees suitable for lawns and parks in the west, but there are very few suitable for the street. For example, evergreens, weeping birches, and Bechtel's flowering crab are well adapted to the lawn but are ridiculously out of place on the street parking. I bear in mind a row of Colorado Blue Spruce planted as a street tree. Trees for street planting may be divided into two groups: those to be used for permanent effects —long-lived, slow-growing species; and those which produce quick, temporary shade and are usually short-lived. The latter are valuable for use in alternating with those of the first group.

For western planting, in the first group may be placed American elm, cork elm, American linden, Norway maple, hard or sugar maple, green ash, and hackberry. American elm is the most satisfactory. Here it will reach a diameter, breast high, of about eight inches in fifteen years. It is adapted to wide streets and should be planted not less than forty feet apart. American linden is rarely found on western streets, but it is a tree that can be recommended for this region. It is a

comparatively rapid grower, symmetrical, hardy and long-lived. Norway maple, as linden, is a rare tree on streets, although it has found a place on lawns and in parks. It is a beautiful tree, shapely, free from injury of high winds and heavy snows, so common in the west, and is a tree to be strongly recommended for western planting. Green ash is a tree for narrow streets. It is more hardy than the white ash; it has a bright, green foliage, is remarkably free from insects and requires very little pruning. Hackberry is another satisfactory tree for street planting, but needs considerable attention to prevent a scraggly growth.

In the second group of less desirable trees for western streets may be included silver maple, box elder, honey locust, black locust, Carolina poplar, willows and cottonwoods. Silver maple suffers from sunscald; its branches are slender and weak, being easily broken by wind or snow. It cannot be said to do well under western conditions; everywhere one sees the pale colored foliage of sickly silver maples. Box-elder is most illy-shaped; no tree exhibits such a strong tendency to develop weak crotches; its free use on streets is not advisable. The locusts have been quite extensively planted, but for permanent street effects, cannot be highly recommended. Of the willows and cottonwoods there are many species which do well; the western broadleafed cottonwood and the lanceleaf cottonwood are most commonly planted. These two trees are native throughout the plains region of Colorado; the former is the most common shade tree. The "cottonless" form of the lanceleaf cottonwood is a very desirable tree, superior or at least equal to the Carolina poplar. Carolina poplar, however, is a most valuable tree to the west. It produces abundant shade in from 6 to 8 years. Because of its erect habit, it will stand crowding better than any other cottonwood, and is an ideal tree for alternating with long-lived species. The "cottonless" form is distributed by most western nurseries.

Douglas Fir for Planting Successful

A two-year-old plantation of Douglas fir on the Oregon national forest shows 94 per cent of the trees living. Extensive plantings of young trees in Washington and Oregon are costing only $8 an acre. Direct seeding of lodgepole pine has been successful without exception on the Arapaho national forest, Colorado. Several of the areas sown two and three years ago show from 5,000 to 10,000 seedlings per acre.

OUR MOUNTAIN MEADOWS

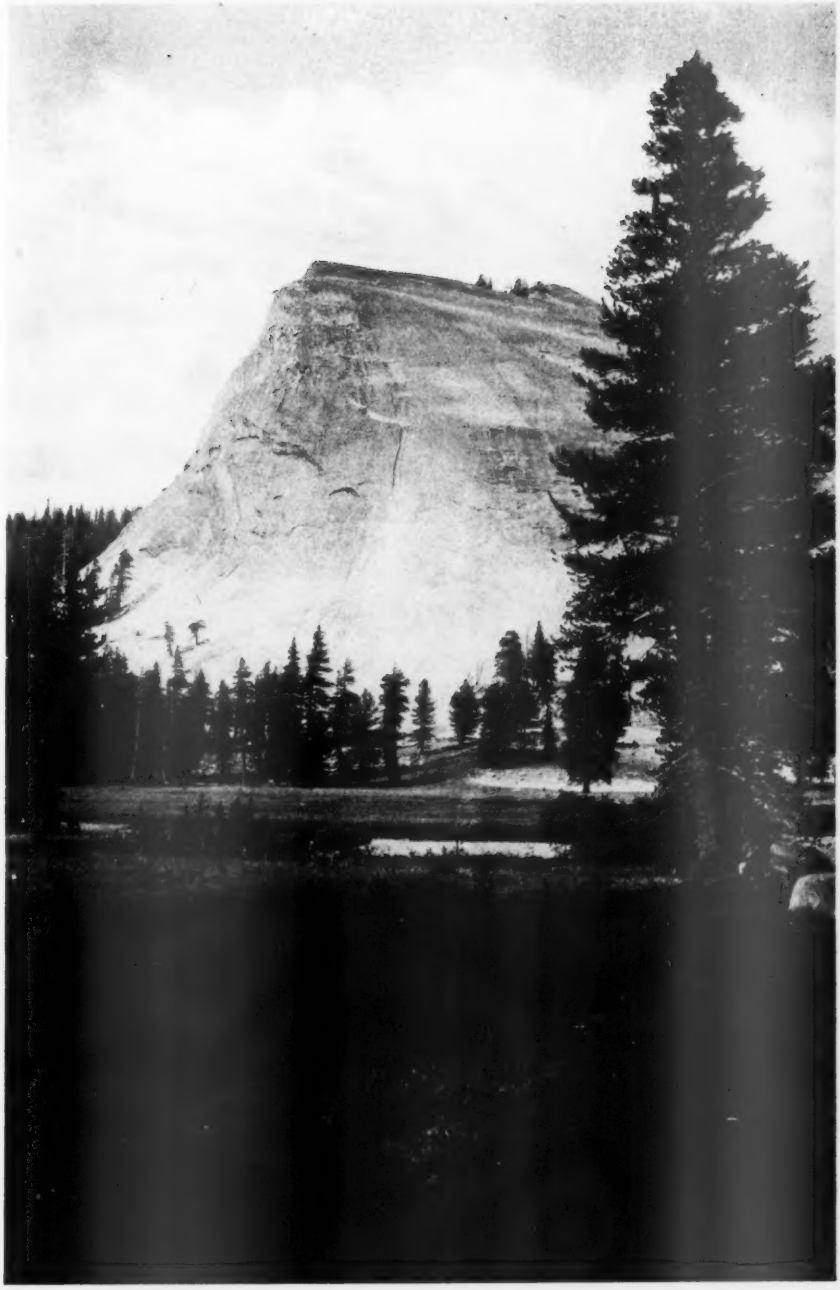
By HAROLD C. BRADLEY

CONSERVATION of our forests has become so much a part of the ideals of the average thinking citizen of the United States today that arguments in favor of the idea need hardly be advanced. Almost every State that still retains wooded areas of significant size is pledged to preserve and conserve those areas to the best of its abilities. Almost every State where forests can grow and where land is available for the purpose is striving to develop forests where today none stand. The withdrawal of forest land by the Government for protection and management is an enterprise which commends itself to every intelligent man. The project as a whole has come to stay; it needs no comment. There are details in the practical working out of the project which need consideration and discussion. It is with one such minor detail that this article has to do—the conservation of our mountain meadows.

In the mountains with which the author is most familiar—the Sierra Nevada range of California and some portions of the Rocky Mountains—the forest-girt meadows with their grass and flowers and tinkling brooklets are a conspicuous part of the landscape. They vary in size from little pockets of grass just big enough to stake a horse on for the night to great verdant valley floors like the Tuolumne Meadows of the Yosemite National Park. They are always lovely, for even in the lower levels of the mountains they retain their verdure when all else is parched and brown with drought, and in the season of their prime are fragrant and bright as any garden. To the wanderer with his horse they are more than lovely—they are a necessity. Not only that, but, as will be shown later, they are one of the essentials in prolonging and equalizing streamflow. Wherever the conservation of water on our National Forests is of importance, and wherever the maintenance of good camping facilities is also of importance, as in the Yosemite National Park, these mountain meadows must be preserved. In the latter case they are of such great value to the public that their preservation would seem to be the first thought of the administration. And yet it is perfectly evident to anyone who has traveled the trails of the Yosemite region that these little meadows are fast vanishing. Exclusive of the three or four great valley meadows, I should estimate the loss of meadow area in the last ten or fifteen years as fully twenty-five per cent. And thus far, no step has been taken to check the loss.

In what follows I shall speak especially of the meadows of the Yosemite Park, though the same condition prevails north and south throughout the National Forests of the Sierras, and to a less degree in the high plateau regions of the Bitterroot Forest Reserve of Idaho. I am assured that it is also to be found in the reserves of the Rocky Mountains proper. Indeed, wherever the mountain range has passed through such a history as to have produced these meadows, they must develop, diminish, and eventually disappear if left to themselves. They represent but a passing phase in the cycle, albeit a phase which may be retained indefinitely if properly cared for.

In the first place these meadows have had a variety of origins. The great majority of them are lake beds, glacial pockets scooped out and silted up, or valley bottoms dammed by a moraine. Along a little stream near its sources, a fallen tree may be the cause of holding back the water, retaining its silt and eventually forming a little meadow patch. In this way, one finds along the upper few miles of brooks that spring in the parklike plateaus, countless little garden spots, moist and rich with grass and herbage. In the Yo-



LOWER TUOLUMNE MEADOWS.

THE OUTPOSTS OF THE INVADING FOREST ARE TO BE SEEN ESTABLISHING THEMSELVES IN THE VERY MIDDLE OF THE MEADOW AND IT WILL NOT BE LONG BEFORE ALL OF THIS FLAT LAND WILL BE FORESTED.

A Lake Bed Meadow.

THIS IS A TYPICAL MEADOW OF THE HIGHER LEVELS. HERE WAS ONCE A SHALLOW LAKE. THE GROUND IS GRASS GROWN AND STREWN WITH FLOWERS.

semite Park there is scarcely a stream which near its source does not wander through a score or more of these little mountain gems—emeralds strung upon a thread of silver. And wherever there is a meadow there is a place to camp, with water and rich pickings for the horses. Late in the season, after months of cloudless skies, after the snow fields have shrunken to their smallest size and the forest stands parched and tinder dry, the little meadows still are green and cool and decked with flowers, and from their lower ends the precious trickle of water still flows away to keep the shrunken brooklets running, and the river farther down.

Left to itself, this lake-bed meadow in time grows dry. The peat bog holds back more silt each year till a spongy soil is formed. For a period the grass and flowers flourish, as the ground grows slowly drier and firmer, but in the end the trees push in and claim the land, and the meadow exists no more. Even the lodgepole pine demands a certain degree of dryness before it will grow, but as it gains a foothold round the edge of such a meadow its rootlets carry the water up out of the spongy soil and into the air currents. Its leaves aggregate a surface many times that of the meadow under it, and from this increased surface evaporation proceeds rapidly. Little by little, the tree as it grows apace pulls more and more of the water from the meadow reservoir, throws it higher and higher into the air where the scorching breezes blow, and from its tremendous leaf surface the water is quickly lost. About the feet of the first tree a host of seedlings springs and like a skirmish line advance into the meadow. A series of dry years may make a large zone about the edge of such a meadow habitable for the pines and in they crowd wherever a seed can sprout. Once in, they hold

PORTION OF THE TUOLUMNE MEADOWS.

THIS SECTION IS IN THE UPPER END OF THE YOSEMITE NATIONAL PARK. THE FOREST IS GRADUALLY CLOSING UP THE LITTLE VALLEY.

RESISTING INVASION.

THIS MEADOW ALTHOUGH SURROUNDED BY TREES HAS SO FAR RESISTED INVASION AND IS STILL GREEN AND COOL AND DECKED WITH FLOWERS.

their own by their increased evaporation. Rarely indeed does one find a meadow so invaded, able to drown out its foes in succeeding wet seasons. Once the process gets under way the fate of the meadow is sealed. The young pines grow and multiply with amazing rapidity, and in the course of a decade or two the meadow is no more. In its place there stands a thicket of spindling lodge poles reaching upward desperately in their fight for light and air, shading out the grass and flowers, robbing the soil of its moisture and converting the open glade into a jungle of slender saplings. Comes a heavy storm of wind and down go the weakly lodgepoles a tangled mass of kindling for the first spark to set ablaze. The peaty soil, dried out, burns too and all that remains of the once lovely meadow is a charred patch of utter desolation that centuries may hardly heal. If the thicket is not destroyed by storm, but continues to grow, the resulting timber is of little use, and standing crowded together is ever menaced by fire, which in such a growth would burn with greatest fierceness. For our meadow we have worse than nothing in return, and the brooklet which trickled from the meadow runs less and less, and eventually stops entirely.

It may be stated positively that the mountain meadows of the Sierras and elsewhere are as valuable for regulating streamflow as are the forests themselves. On the ridges and valley slopes the trees shade the snow and allows the spring melting to go on slowly. The forest humus also holds back the rapid runoff to the valley bottom. But if that valley bottom is filled with lake-bed meadows another check is placed upon the freshets. The deep spongy soil fills itself to overflowing; it forms a reservoir underground with all the physical advantages of a sponge, tenaciously retaining the water, preventing

the rapid flow from upper to lower levels. And when the spring melting is over and the surplus from the valley slopes has ceased to run, the meadow still retains within itself a mass of water which will slowly seep away to the brooklet and keep running through the summer months of drought. Nor does the meadow lose much to the air. The thick grass prevents rapid air currents close to the ground, and the layer of air saturated with moisture lies like a blanket over the meadow preventing further evaporation. At night much of this moisture is again precipitated as a drenching dew. In contrast to this, the breezes are constantly moving through the trees, and they are always dry. They pick up from the leaves whatever moisture they will release. The more rapid and vigorous the growth of the trees, the more moisture will they carry up for evaporation. It would be difficult to estimate the difference in the amount evaporated from a meadow, and the amount lost from the same area grown up to trees. I believe the excess of the latter is easily a hundred-fold greater than the former. The ideal conditions, then, for equalizing stream flow from mountain regions like the Sierra is to preserve the timber on the slopes and the meadows in the valley bottoms.

Not only are the mountain meadows necesssary for the proper conservation of the streams, but in the National Park where the fundamental purpose of the reserve is for play-ground use, the value of the meadow can scarcely be estimated. A man can go where his horse can go, and where his horse can find feed a man must camp. The fact that the Yosemite Park is dotted with thousands of these verdant feed patches is one of the reasons why this park is the most ideal region in this country for the pack—and the saddle-horse type of camping. The climate is practically rainless for the three summer months. The little meadows prevent its becoming a desert. Eliminate the meadows and camping will cease absolutely. Decrease the number and area of the meadows and camping will correspondingly grow less easy and attractive. The park will thus lose the real reason for its existence as a park.

To anyone who traversed the park a decade or more ago and returns to it today, the change which is taking place is perfectly apparent. Meadows which ten years ago were clear and open to grazing, are today pine jungles devoid of feed for the horses. Others which have not been blotted out completely have been considerably diminished. Excluding a few of the great meadows, like the Tuolumne Meadows, which will long maintain themselves, I should say that the meadow area of our National Park has been reduced twenty-five per cent during the last ten or fifteen years. Within another decade the securing of feed and camping places along some of the trails will become a serious problem, unless steps are taken to check the advance of the forest. For example, a favorite camping place along the Big Oak Flat Road, a few miles from the Valley, was Tammarak Flat. Fifteen years ago the lower end of the flat was a charming meadow through which ran a fine trout stream and about which on higher ground stood a well-grown forest. Today there is scarcely a vestige of the meadow at the lower end, the young trees crowding in so close that a pack horse can scarcely force his way through. There is no grass, where before was fine feed. This is one of many instances of a lovely camp ground of a few years ago absolutely effaced. All over the Park the same forces are at work, nor is it surprising that the change should thus suddenly appear. Presumably the lakes of about the same size left as the glaciers receded, have silted up in approximately the same period of time. The resulting flats have grown to meadows, and now a large percentage of them are ready to undergo the final transformation. Furthermore, the early grazing of this whole region by the sheep, and the fires kindled by their herders at the end of each season burning off the dry grass and brush, destroyed each season's crop of seedlings. From the 'sixties, therefore, to the time when the Park was reserved from grazing, the forest advance was artificially prevented. It has

A Change is Near.

HERE IS A SHALLOW LAKELET WHICH IT IS APPARENT, OWING TO THE NATURE OF THE COUNTRY, WILL SOON DRY UP AND A MOUNTAIN MEADOW WILL BE FORMED.

A Stream-Side Meadow.

HERE THE INVASION IS WELL ADVANCED AND THE YOUNG GROWTH OF TREES THICK AND HARDY.

only been within the last twenty years or less that sheep grazing on the Park has been effectively stopped. It is significant that the jungles now growing up in the meadows are all less than twenty years old.

There can be no question as to the facts. They are patent to any observer. The remedy is less clear. The fact, however, that the sheep herders prevented the change that is now in progress shows that the problem can be solved. Their method was, however, a wasteful one. Not only were the seedlings in the meadows destroyed by their fires, but the young trees throughout the burned-over areas of the forests, and many a full-grown tree as well. The cost to the forest was far greater than the good to the meadows. There is, however, one way that might prove feasible. Each year several hundred soldiers are stationed about the Park as a patrol. They register and control the movements of campers, and are expected to prevent cattle and sheep from being herded into the Park, as well as to prevent or extinguish forest fires. Now if this band of soldiers can be set to work with brush scythes and axes, trimming out the meadows, a great deal of good will result. Two or three seasons of such attention will easily restore the meadows to their former state, and a little work each year will keep them in good condition. If we are not willing to have the soldiers work, then a force of forest rangers should be given the task of keeping the meadows open. Whatever it costs in trouble or money, we should see to it that this Park of ours—the best and most wonderful camp ground in this country—is not allowed to lose its public usefulness and charm. The meadows, once gone completely, can never be restored.

WILD LIFE IN MINNESOTA

By PROF. CHARLES JOHNSON, *University of Minnesota*

THE mink population has greatly diminished in many parts of Northern Minnesota, where it was formerly quite common and where conditions are well suited to its habits. That it has been trapped out is the cause.

The otter, the pine marten or sable, and the fisher are so few in Minnesota today that their total disappearance from the State seems but a matter of a few years.

Unless protective measures are adopted, the end result is clear.

The fisher and the marten are primarily deep-forest animals, and therefore are doomed to pass with the forest.

The lynx and wild-cat have become exceedingly scarce. The lynx has nearly vanished from our north woods and the wild-cat is too scarce to have any serious standing as a game destroyer.

The black bear, once plentiful throughout all the northern regions of the State, has suffered relentless persecution, and to this day is generally killed on sight whenever opportunity offers. Harmless alike to man and beast in our State, the black bear should have a closed season for a period of years, and when reopened, the killing season should be regulated by law.

I believe our deer population at present is between, say, 30,000 and 40,000 at most.

Some of our wild life is near extinction, and the killing of it should be completely stopped for a period of years. Others are surely decreasing, perhaps more rapidly than we are aware, and still others are as yet holding their own.

Our big-game animals and many of our choicest fur-bearers we have seen are essentially forest dwellers, and their fate is inseparably wrapped up with the fate of the forests. Minnesota has abundant natural resources for the permanent preservation of all her wild forms and needs but the awakening of the people to a full realization of their worth, that they may insist upon the enactment of proper measures such as the proposed forestry amendment for State forests would provide for game refuges.

China's Match Wood Imports

The imports of matches into China greatly exceed in value any other wood product. Most of the matches come in from Japan.

Sawdust for Grape Packing

Redwood sawdust is being used by vineyardists in California for packing fresh table grapes. It takes the place of the ground cork used for imported Spanish grapes.

Idaho's Highest Peak

Hyndman Peak, Idaho, the highest named peak in the State, is more than 12,000 feet high. Several unnamed peaks near it are of about the same elevation. All are on the divide between the Sawtooth and the Lemhi national forests.

Removing Egg Masses of the Tussock Moth Caterpillar.

CHILDREN WAGE WAR

THE sad ravages of the Tussock moth caterpillar in New England were apparent to all those who lived or passed through that section of country last summer. Whole orchards of fruit trees as well as the trees and shrubs by the wayside were defoliated and left looking as if a fire had passed over them. Especially in the town of Stockbridge, Massachusetts, the havoc wrought by this pest was most complete and destructive.

This so stirred the hearts of the people there, that they determined to attempt some "preventive treatment" for this spring, and so they arranged to enlist the school children in the work. Accordingly, three organizations—the Laurel Hill Association, the Town Club and the Grange—clubbed together and offered prizes to the schools which would bring in the largest number of "egg masses." They were to be taken to the teachers, who would count and then burn them. Only the grade schools could compete, and the price to be paid was fifty cents per thousand "masses." This money, as well as the prizes, was given to the school as a body and not to the individual children. The first prize was $10.00, and the second prize was $5.00. Incidentally, it shows the public spirit of the children that they were so interested, worked so hard, and accomplished so much simply for the good of the town and not for their own pockets. The official report of the result of this enterprise has just been presented, and the first prize was won by the Interlaken Grammar School and the second prize by the Interlaken Primary School. The total cost of the campaign was $98.00, and 172,719 egg masses were destroyed.

CHESTNUT BLIGHT CONTINUES

By OLIVER D. SCHOCK

THAT the chestnut bark-disease has not abated its virulence in southern and eastern Pennsylvania forest areas this spring because of natural enemies, as some optimists had predicted, has been confirmed by recent investigations. The numerous observations just made have effectually dispelled the idea prevalent in some minds that Nature would soon come to our relief and supply some other parasite to remove or effectually control this fatal enemy of the native chestnut. In some unknown manner, the pest is still able to maintain its ascendancy in power, and those who are regarded as the most competent criterions as to the situation in its true aspect declare that there is as yet no foundation for the fulfillment of the hope that the equilibrium of Nature lost would be restored in the near future; in fact, chestnut owners are in despair, because they are compelled to battle against the disease, so far as Pennsylvania interests are concerned, without receiving any assistance from the State authorities.

Reports from western Pennsylvania counties are more favorable; for wherever the cutting-out process was practiced last season, the bark-disease is found but infrequently, and if the effective work done by the State at that period is now maintained by the owners, they will be able to make a successful stand against the rapid and costly spread of the parasite. At the worst, only spot infections occur in the counties west of the Allegheny Mountains, and it will be a matter of sincere regret if the contest inaugurated by the State should now be permitted to lapse, because the Chestnut Tree Blight Commission refused a proffered appropriation of $100 because the amount would prove insufficient to perform all of the work that had been mapped out for the coming two years, and because a larger amount had been asked for. In this connection it might be explained that the Pennsylvania Chestnut Tree Blight Commission has closed its financial accounts with the Commonwealth of Pennsylvania, and refunded to the State Treasurer a snug little balance which had remained unexpended.

Friends of forest conservation are making the prediction that the next legislature will again make an appropriation for the renewal of the fight for the preservation of Pennsylvania's immensely valuable chestnut timber. The amended law on the statutes continues the Governor's authority to appoint the necessary members of a Chestnut Tree Blight Commission indefinitely, or just so long as their services may be regarded as of value to the Commonwealth. This amendment to the original Act of Assembly was passed and approved during the closing days of the session of 1913. Under these conditions, it is only necessary that an appropriation bill should be introduced and passed. There is hardly any doubt, whatever, as to the fact that either of the gubernatorial candidates now contesting for the office being in thorough accord with all reasonable forestry questions or propositions. The Commonwealth, with its own one million acres of forest land, could not be otherwise than in sympathy with the question of forest protection and development.

Nurserymen report that there is a better demand for chestnut nursery stock than last season; that certain varieties are being ordered and planted more freely, and that there are expectations that with proper watchfulness and cultivation, chestnut orchards may again be established with success. Planters venture upon the expectation that the chestnut blight may be exterminated by the discovery of some simple remedial agency, such as was the case when the fruit tree owner learned that lime, sulphur and salt, properly com-

AFFECTED CHESTNUT TREES

THESE TREES ARE BEING SPRAYED WITH BORDEAUX MIXTURE IN THE EFFORT TO SAVE THEM FROM THE BLIGHT.

bined, was all that was needed to keep under control the pernicious San Jose scale, which at one time had threatened to exterminate every apple tree in Pennsylvania. The United States Department of Agriculture, through the efficient help of Dr. Haven Metcalf, Pathologist of the Forestry Bureau, offers much encouragement through its research work upon the blight and a long line of experiments in several laboratories.

The bibliography of the chestnut-tree bark disease shows the wonderful interest that this new enemy of the chestnut has already aroused. Over 300 publications are quoted, and the numerous writers all agree upon the general opinion that the blight is a most difficult disease to control and eradicate. Those engaged in genuine field work formed the same belief at the very outstart of their task, although there was a material difference as to the methods of treatment, etc. Pennsylvania's literature relating to the blight will be the most complete and exhaustive that has been prepared by any State up to this period. Its practical field work attracted widespread attention, and there is ample occasion to express the regrets of the thousands of disappointed

friends of forestry who were anxious that the fight should be continued. Fully 200 trained men were engaged in the battle at one time, and every county and nook of the State had been thoroughly scouted when the final orders to discontinue all further outdoor work were issued. His Excellency, Governor Tener, who is a staunch friend of forestry, has at all times been in hearty accord to save the chestnut of Pennsylvania, while the National State forestry officials also were always strongly cooperating with the Chestnut Tree Blight Commission.

CONSERVATION FOR LUMBERMEN

AT THE recent meeting of the National Lumber Manufacturers Association in Chicago, Capt. J. B. White, of Kansas City, Mo., reporting as chairman of the conservation committee, outlined in vigorous language just what conservation of the forests does mean now and may mean in the future for the lumbermen. He said in part on this subject:

"I believe that conservation is good for about all the ills that lumbermen are heirs to. I believe it will cure all the ills that afflict the lumber body. I believe that if we would conserve, if we could legally conserve our timber resources, that we would be doing something of benefit to ourselves in this generation, and to all succeeding generations, and everyone says, 'That is our duty.' They say it is the duty of us individually to practice conservation, but it is a crime if we get together and agree upon a method of conservation; and that is the position we are in. We are told that we should conserve; we are told that we should make no more lumber than the market requires; we are told that we should market and sell everything in that tree when we cut that tree down, and yet we are not permitted to get together and agree on how this can be done economically. And so I have said that I wish some one would do it for us.

"I wish it were possible for the Nation to pass a law, uniform in all the States, that would make it a crime to leave any part of the tree in the woods that would make lumber good enough for a hog pen, a sidewalk, or for sheathing on a house, for boxes or for anything else, and if it were made a criminal offense, and if the very fact of your finding the tops of trees in the woods, scattered throughout the forests, were regarded as prima facie evidence that you had violated the law by committing waste, there should be some way of going to the penitentiary, or else making the price high enough so that you could afford to bring that log in.

"Now, if we can not get together and agree upon a method that is practical and economical and possible, some of our legislators and politicians ought to pass laws that would be so drastic that we could not escape saving our forests without going to the penitentiary. Now, that is not an overdrawn picture; it is an absolute fact. I think that we are committing a crime if we waste our trees and leave nothing for future generations.

TREE-PLANTING LOGIC.

"We have been told that we should plant trees. We have found by observation, by examining the forests of foreign countries, that trees are planted and can be planted here at a profit, but not when we can buy trees already grown for half the amount that it will cost to grow them. Unless we can get for our stumpage something near what it will cost to grow a poor substitute in a second-growth tree, we are not going to practice conservation; and as a wise old solon—he is not old—he may not be here; I do not see him; he was here this morning—I call him a wise old solon, but we used to call him the silver-tongued orator when he attended our conventions some years ago—he said

once before a legislative committee that we never could conserve our forests until we made our forests worth conserving, and that is the truth. No man will plant a tree nor can he afford to plant a tree unless the product that grows is sufficient to pay the cost of planting and taking care of that product until it is ready for the market.

"A number of years ago a committee on conservation was apopinted by the president of the National Lumber Manufacturers' Association, and I was made chairman of that committee. The salary of $100 a month allowed for that year I was authorized to turn over to the secretary of the conservation association, of which Hon. Gifford Pinchot was president, and it was so disposed of. Much good was done in the way of publicity, which helped to give the people a better understanding as to the correct principles of lumbering and forestry. At that time we were censured for cutting down the trees. It was a hysteria that went over the country, and nothing was left in that hysteria except the sentiment of 'Woodman, spare that tree!' It was wholly forgotten that it was necessary to cut commercial trees, to cut lumber for the marget, to build cities, towns and homes for the people, but the lumberman was said to be a wasteful man; he was destroying, cutting down, burning and destroying; yet when we want to get together and agree upon a policy there is no way of getting together and so agreeing. Of course that will some time come, because it is absolutely necessary.

"As this annual meeting is usually only attended by the officers and delegates of the respective affiliated associations of white pine, yellow pine, cypress, redwood, fir, hemlock and hardwood organizations it is difficult to secure a committee on conservation who can get together and prepare a plan of practical cooperation in the practice of forest conservation that would be applicable to the various organizations representing the different woods under varying conditions. Therefore, your committee recommends that the subject of forest conservation be given free expression in discussion by all the delegates, and that at each annual meeting some recognized authority be invited to speak or to prepare a paper to be read in our meeting, and that the American Forestry Association of the United States be asked to recommend such a speaker for our next annual meeting."

Successful Planting

Results from western white pine plantations, three seasons or more old, show an average of 97 per cent success. On average white pine soil planting can be conducted for from $5 to $6 per acre.

Fotanists View of Cypress

Forest botanists recognize only one cypress in the United States. Its range extends from Delaware southward around the coast into Texas and up the Mississippi valley to Illinois and Indiana. It is one of the few cone-bearing trees which drop their leaves in winter. The heartwood of cypress is noted for its decay-resistant properties.

Chinese Reforestation

The Chinese national censervation bureau is considering reforestation at the headwaters of the Yellow River. The government reports shows that this will ameliorate the torrents and cause a more regular flow from the now denuded uplands. It is acknowledged, however, that this reforestation may not have an appreciable effect within the lifetime of the present generation.

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110 Miles of Fire Lines

In preparation for the coming fire season in California, 110 miles of fire lines have been built on the Sierra national forest.

On the Automobile Road, Which Makes Pisgah Forest One of the Most Accessible Mountain Forests in America.

GEO. W. VANDERBILT, PIONEER IN FORESTRY

By Overton Westfeldt Price

OUR national problem in forestry depends chiefly upon the care given to private forests. The men in the United States who first applied practical forestry to their holdings were in a very real sense public benefactors; for they created those object lessons in the methods and the results of forest conservation which were absolutely essential to its wider application to private forest lands.

First among the pioneers in the practice of forestry on a large scale in America was the late George W. Vanderbilt. It was he, who, nearly twenty-five years ago, purchased a great mountain forest tract on the headwaters of the French Broad River and its tributaries in Western North Carolina, and acting under the advice of Gifford Pinchot, then a consulting forester, at once put his forest holdings under conservative management. In those early days it called for a man of much vision and of strong convictions to adopt the practice of forestry. Those were still the days in which forestry was looked upon with indifference by most Americans, and as a chimerical and fantastic theory by not a few. The practical possibilities of forest conservation as a sound business investment for the forest owner had gained little hold on the public mind and it is exceedingly probable that Mr. Vanderbilt acted in the face of the remonstrance of his business advisors, when he set out to demonstrate that forestry can be applied successfully to private lands, with benefit both to the community and to the man who owns them in fee simple.

Two definite and resolute motives actuated Mr. Vanderbilt in adopting forestry and in continuing to practice it unflinchingly on his forest holdings of considerably over one hundred thou-

THE LATE GEORGE W. VANDERBILT, PIONEER IN PRIVATE FORESTRY AND A VICE-PRESIDENT OF THE AMERICAN FORESTRY ASSOCIATION.

sand acres, up to the time of his death. The one was the belief, which has been fully justified by the results which he attained, that Western North Carolina with its rich hardwood forests, and its remarkable possibilities for industrial growth, offered an exceptionally favorable opportunity for good returns from timber growing. The other was the conviction that the ownership of forest lands entails certain definite responsibilities to the public; for Mr. Vanderbilt was one of those who held that the private ownership of any resource necessary to the general welfare carries with it the moral obligation of faithful stewardship to the public.

I recall an occasion a few years ago on which I heard Mr. Vanderbilt, usually a man of much reserve, speak

out from the heart his admirable conception of his duty as the owner of Pisgah Forest. The question of the terms on which a pending timber sale should be made, was before him for decision. He faced the alternative of requiring that cutting under this sale should follow the methods of practical forestry, or of waiving all restrictions looking to the protection of the forest. He was reminded that the latter method would naturally be more attractive to prospective purchasers, and that its adoption would probably result in a much higher price being paid for the timber.

"I have stuck to forestry from the beginning," said Mr. Vanderbilt warmly, "and I shall not forsake it now. For me to impair the future usefulness of Pisgah Forest in order to somewhat increase present revenues, would be bad business policy. But apart from that, it would be bad citizenship. As I see it, no man is a good citizen who destroys for selfish ends a growing forest."

Such was the sincerity and the deep sense of obligation to his fellow men which characterized Mr. Vanderbilt's policy of forest conservation. Pisgah Forest, its mountain slopes clothed in an unbroken mantle of protective tree growth, is his monument. He transformed it by nearly a quarter of a century's efficient fire protection, from a forest characterized by scanty young growth, thin humus covering, and impoverished soil, as the result of injury it had suffered in former years from excessive grazing and recurrent fires, to one whose silvicultural condition is probably unequaled elsewhere in the Southern Appalachians. The forest mould has again accumulated, and a young growth of remarkable density has sprung up under the old trees; and in the rich poplar coves of Pisgah Forest and on its slopes and ridges as well, has taken place with the unbroken years of fire protection, a remarkable restoration to primeval forest conditions.

If a man wants to profit by probably the most forcible object lesson in the results of forest conservation which America contains, he needs only to visit one of the many forest tracts of the Southern Mountains on which nature is struggling against the triple combination of fire, unregulated grazing and destructive lumbering, and then to feast his eyes on the dense and thrifty growth of Pisgah Forest, with its thickets of hardwood saplings, its deep humus layer, and its rare freedom from disease.

But Mr. Vanderbilt did not only preserve the productive capacity of Pisgah Forest. He made it, under a broad and careful plan of development, one of the most easily accessible mountain forests in the United States. In the old days, an excursion into its recesses entailed for its accomplishment an unfailing reserve of enthusiasm, and the vigorous cooperation of a sure-footed mule. For when Mr. Vanderbilt acquired it, Pisgah Forest was a wilderness, and the only means of penetrating it was over a few dim trails occasionally used by the mountaineers, who dug, "sang," grazed cattle, hunted, fished, and possibly "stilled" now and then within its boundaries. Today good roads run up each of the larger valleys, and a network of well graded trails leads from them to all parts of the property. The aggregate length of the roads and trails probably exceeds 200 miles.

The crowning achievement of Mr. Vanderbilt's vigorous policy for giving Pisgah Forest so complete a system of transportation as to make it practically a park, was the construction of sixteen miles of automobile road, which make it possible to reach the heart of the tract in a couple of hours from Asheville, and to enjoy a superb panorama of mountain scenery on the way. At its highest point this road reaches an altitude of five thousand two hundred feet.

Biltmore Forest, the second large division of Mr. Vanderbilt's forest holdings, lies on both sides of the French Broad River near Asheville. As the result of its accessibility, it suffered far more severely from destructive logging than did Pisgah Forest at the hands of its former owners, most of them small farmers, who found a ready market in Asheville for firewood, and for saw logs at local mills. Cutting had been

FROM PISGAH RIDGE OVERLOOKING THE LOWER SLOPES OF PISGAH FOREST, ON THE TRACT PURCHASED BY THE NATIONAL FOREST RESERVATION COMMISSION ON MAY 21.

AS THE RESULT OF PROTECTION FOR NEARLY A QUARTER OF A CENTURY PISGAH FOREST IS WELL STOCKED WITH DEER AND OTHER NATIVE GAME AND THIS GAME WILL BE CAREFULLY PRESERVED.

done with an eye single to immediate returns and wholly without regard for the safety of the forest, and fires had been permitted to burn unchecked. There had been much injudicious clearing of steep upper slopes, which, after a few years of unprofitable cultivation, were generally abandoned to erosion, which in the loose soil and exceptionally heavy rainfall of the region, occurs with remarkable rapidity. But here again forest conservation for nearly a quarter of a century has worked a wonderful change. Stock have been wholly excluded from the forest, careful improvement cuttings aimed primarily at the betterment of its silvicultural condition have been carried forward, and cleared lands unfit for agriculture on account of steepness and thin soil have been planted to trees. Biltmore Forest is today full stocked with a thrifty stand, and producing a steady and increasing yield of firewood and small timbers. The forest plantations set out on denuded lands, which cover in the aggregate about four thousand acres, are among the most successful in America; and Mr. Vanderbilt had the well-earned gratification of seeing harvested as the product of careful thinnings, logs suitable for box boards, grown from seedlings planted as the result of his forethought over twenty years ago.

I do not want to close this brief account of the first great object lesson in forest conservation in the United States on private lands without a reference to the personality of the man who created and enriched it with each year of his faithful stewardship. Mr. Vanderbilt possessed singular gentleness and nobility of spirit, and had an intense and abiding love for the world out-of-doors. As his life lengthened, he was drawn more and more to long sojourns at Buck Springs Lodge, a log structure within a mile of the top of Mount Pisgah; and probably no scene was so dear to his heart as the view from the Lodge of the green gorge of Big Creek, winding down among a jumble of mountains to the wide valley of the French Broad with the outlines of the Blue Ridge beyond. During the last years of his life, more and more of his pleasure was gained from landscape architecture, of which he was a faithful

student and for which he possessed rare power. He laid out in the vicinity of the Lodge, trails carefully designed to reveal exquisite glimpses of the mountains and these he developed still further, by skillful cuttings which he termed appropriately "painting with the axe." It was a wholesome sight to see this man of great possessions supervising the development of vista cuttings for the disclosure of some view whose latent possibilities his skilled eye alone had detected; and it was characteristic of him, to judge no such achievement complete until it had contributed to the enjoyment of his friends.

The range of Mr. Vanderbilt's charities in the mountain community which owes so much to him, he scrupulously withheld from common knowledge. But the largest of his many contributions to the general welfare lies in the great and wholesome lesson taught by the activities of his vast estate. For not only did he demonstrate the methods and the practical advantages of forestry for private owners; he was also a pioneer in scientific agriculture, in horticulture and in model dairying. The stimulus afforded by his example towards improved agricultural methods in the South is beyond all estimate.

George W. Vanderbilt earned, and no doubt he will receive, a high place in permanent public recognition of his distinguished public service. Were his admirable conception of the moral responsibility which accompanies the private ownership of natural resources the rule instead of the exception, the conservation problem in America would be already solved.

PISGAH FOREST PURCHASED

ON May 21 the National Forest Reservation Commission formally approved the purchase of Pisgah Forest of 86,700 acres for $433,500. This price is less per acre than the average of other tracts already acquired although Pisgah Forest has been developed into one of the finest forest properties in the country by the late George W. Vanderbilt.

The purchase was made possible through the generosity of Mrs. Vanderbilt, who accepted a price over $200,000 less than the one first asked because she desired to perpetuate her husband's pioneer work in forest conservation, and to insure the use and enjoyment of the forest for the American people for all time.

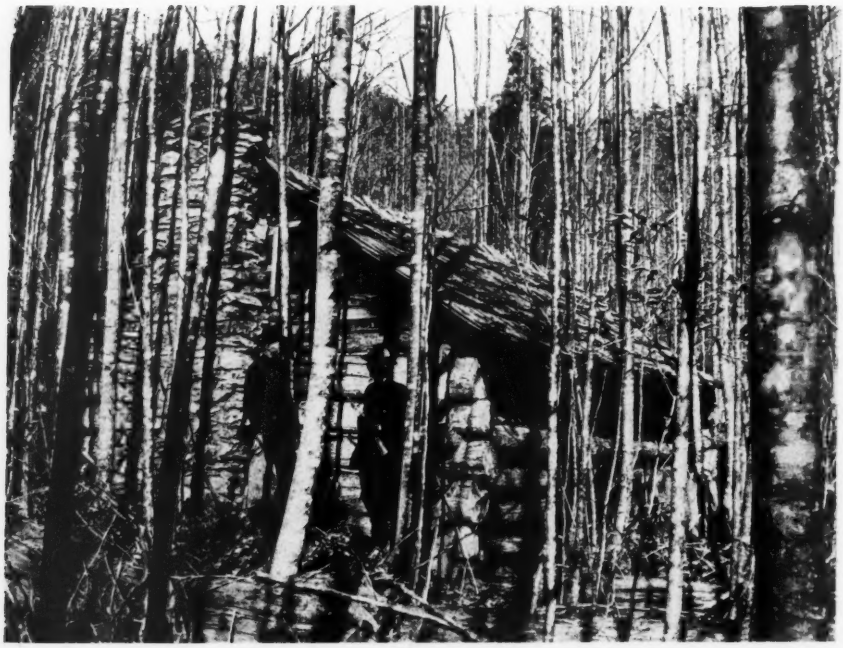
Mrs. Vanderbilt's patriotic feeling in the matter is expressed in her letter to the Commission. She wrote in part:

"Mr. Vanderbilt was the first of the large forest owners in America to adopt the practice of forestry. He has conserved Pisgah Forest from the time he bought it up to his death, a period of nearly twenty-five years, under the firm conviction that every forest owner owes it to those who follow him to hand down his forest property to them unimpaired by wasteful use. I keenly sympathize with his belief that the private ownership of forest land is a public trust, and I probably realize more keenly than any one else can do how firm was his resolve never to permit injury to the permanent value and usefulness of Pisgah Forest. I wish earnestly to make such disposition of Pisgah Forest as will maintain in the fullest and most permanent way its national value as an object lesson in forestry, as well as its wonderful beauty and charm; and I realize that its ownership by the Nation will alone make its preservation permanent and certain.

"Accordingly I have decided to make as large a contribution as I can, in order to help bring this result about. I offer Pisgah Forest at a total price over two hundred thousand dollars below that on the basis of which negotiations were entered into with the Government

PISGAH FOREST CONTAINS MANY MILES OF MOUNTAIN STREAMS IN WHICH RAINBOW TROUT HAVE BEEN SUCCESSFULLY INTRODUCED AND PROTECTED. THIS IS NOW THE PROPERTY OF THE GOVERNMENT.

Looking Glass Falls in Pisgah Forest, One of its Many Scenic Attractions.



LOGGING CABIN ON BIG CREEK ABOUT THREE MILES BELOW THE VANDERBILT LODGE ON TOP OF MT. PISGAH.

before my husband's death, my offer to the Government of Pisgah Forest now being at a price of five dollars per acre.

"I make this contribution towards the public ownership of Pisgah Forest with the earnest hope that in this way I may help to perpetuate my husband's pioneer work in forest conservation, and to insure the protection and the use and enjoyment of Pisgah Forest as a National Forest by the American people for all time.

"In the event that my offer is accepted, I shall be glad for the Government to assume control of Pisgah Forest as soon as it may desire. In the same event, it would be a source of very keen gratification to me if the tract retained, as a National Forest, the title of "Pisgah Forest," which my late husband gave it."

GOVERNMENT WILL CONTINUE NAME

In accordance with Mrs. Vanderbilt's desire, the National Forest Reservation Commission will retain the name of "Pisgah Forest"; in fact, the general area, in which this forest is located and in which other purchases may be made, is already designated as the "Pisgah Area." It is proposed also to make it a game refuge for the preservation of the fauna of the eastern mountains. It is particularly well suited to this purpose since it is already well stocked with game and fish, including deer, turkey, and pheasant, and in the streams rainbow trout and brook trout, with which they have been systematically stocked from year to year.

The tract includes portions of Transylvania, Henderson, Buncombe, and Hayward Counties, in North Carolina. It covers the entire eastern slope and portions of the northern and western slopes of the Pisgah range, one of the most prominent of the southern Appalachians. Its forests influence for the most part tributaries of the French Broad river, which unites with the Holstein river at Knoxville, Tennessee, to form the Tennessee river.

Members of the commission look upon this as the best purchase which has yet been authorized, because the forest is in the finest possible condition and less than three-tenths of one per cent can be classed as burned-over land. The price, too, is lower than the average paid for all lands which have been acquired heretofore.

With this purchase, and with others approved today, the total area approved for purchase under the Weeks Law in the eastern mountains is 1,077,000 acres. The officers of the commission are the secretaries of war, agriculture, and the interior, Senators Gallinger of New Hampshire and Smith of Maryland, and Congressmen Lee of Georgia and Hawley of Oregon.

TRAIL CONSTRUCTED BY FOREST SERVICE AT A COST OF $35 PER MILE IN VIRGINIA. "THE ACTUAL SAVING FROM LOSS ON AREAS PROTECTED FROM FIRE DIRECTLY AS A RESULT OF THE WEEKS LAW, WOULD AMOUNT TO A VERY LARGE AGGREGATE SUM."

Forestry at Chautauqua

MEMBERS of the American Forestry Association, their friends, and all others interested, are invited to attend the mid-summer meeting of the American Forestry Association directors at Chautauqua, New York, on Thursday and Friday, July 9th and 10th.

At this meeting some seven or eight thousand teachers from every state in the Union will be present, and the American Forestry Association has arranged a program of popular addresses on forestry subjects, several of them illustrated with moving pictures and colored lantern slides, by some of the leading forest conservationists of the country.

There are to be four hourly sessions each day in the following order:

11 a.m. In the Amphitheatre.
1:30 p.m. In the Hall of Philosophy.
4:30 p.m. In the Hall of Philosophy.
8 p.m. In the Amphitheatre.

There are to be addresses showing the ways in which forest fires start, the great damage done by them, and how they may be prevented; how logging and milling operations are conducted in the forest; how reforestation takes place; how forest planting is done; the methods by which forestry education is provided; how the public can aid conservation of the forests; how necessary the forests are for the preservation of scenic beauty, for public recreation, for the preservation of streams and the perpetuation of hunting and fishing, and upon all phases of forest conditions.

The meeting will be the greatest public gathering in the cause of forestry that has ever been held in this country and members of the Association are not only urged to attend but to prevail upon their friends to go also.

All information regarding train service and hotel accommodations may be secured from Secretary Arthur E. Bestor at Chautauqua, N. Y., or from the American Forestry Association at Washington, D. C.

EXHIBIT OF FOREST PRODUCTS

FOLLOWING an exhibit at Chicago which proved even a greater success than the most sanguine promoters had expected, the Forest Products Exposition for the last ten days of May duplicated its show at New York City in the Grand Central Palace, and here the Chicago success was actually eclipsed both in point of attendance and general public interest. It is gratifying to state, following the many initial doubts as to whether such an exhibit could be made attractive, profitable and of practical worth, that the response of the exhibitors, in space contracts and in appropriations for impressive, not to say elaborate, displays, were so liberal that success was assured before the doors were opened.

Not only were the displays of the different kinds of woods and of their uses of great value to the contractor, engineer and builder and of artistic interest to the public, but they furnished to the prospective builder ideas and information which will be of great service. In addition, the whole exhibit was of marked educational value and none were more impressed with this than were the teachers from the public and private schools, who, with thousands of their pupils, were present by the courtesy of the managers both at Chicago and in New York.

Aside from the trade exhibits was one by the United States Forest Service which in itself was an education in forestry, lumbering, milling, building and land and water conservation, showing as it did not only how to preserve the forests but how to use them to the best possible advantage and illustrating with graphic models the amount of waste now contingent upon transfering the tree into ultimate use and the methods by which most of this waste may be avoided. This exhibit attracted particular attention. There was also a most attractive exhibit by the American Wood Preservers Association, where the many samples of treated and untreated woods for various uses indicated in a most impressive manner how greatly the life of woods for railroad ties, block pavements and other uses may be prolonged by the use of various preservatives. A model of a wood-preserving plant showing just how wood is best treated attracted large numbers.

There were also displays by city park and shade tree commissions, by the Y. M. C. A. of its buildings and its work in lumber communities and camps, and the American Forestry Association had an interesting exhibit showing the nature and the value of its work in the forestry cause. The trade displays, of which space does not permit detailed mention, were of great variety, and on most of them many thousands of dollars were spent for what proved to be a very artistic and attractive display.

The undisputed success of the two exhibits should convince the promoters and the exhibitors that it will be well worth their while to have other forest products exhibits in the future, and that other cities will find them as attractive as did Chicago and New York.

Goats For Fire Prevention

Angora goats have been used with profit to keep fire lines clear of inflammable vegetation on national forests in California.

Seed Yield From Cones

Western yellow pine cones, to the amount of 6,377 bushels, obtained on the Bitterroot national forest, Montana, yielded 9,482 pounds of seed. The average cost of the extracted seed was 41 cents per pound.

CORNELL'S FORESTRY BUILDING

COMMODIOUS and thoroughly equipped for the work, the new forestry building of the New York State College of Agriculture at Cornell University was formally opened on May 15 and 16. There gathered for the ceremony foresters from as far west as Missouri and Michigan and as far north as Canada, some seventy-five in all, who participated in the excellent program and enjoyed the opportunity of getting together for both formal and informal talks on forestry questions. The building which was described in the April number of AMERICAN FORESTRY is now completed and in use, much to the pride and satisfaction of the faculty and the students.

Chief among the visitors was Dr. B. E. Fernow, who instituted the first forestry school at Cornell a number of years ago only to have it later discontinued by legislative action. The American Forestry Association was represented by its president, Dr. Henry S. Drinker, and by several directors. The Society of American Foresters held a special meeting during the period, and there were representatives of the forestry societies, forest fire protective associations, forest schools and conservation organizations of several States.

Acting director W. A. Stocking, Jr., of the New York State College of Agriculture, formally opened the ceremonies, and three sessions were held on May 15 and one on the following day. Chief Forester Henry S. Graves being absent, Assistant Forester W. B. Greeley spoke on national forestry from the viewpoint of the Forest Service; W. H. Vary, Master of the New York State Grange, made an address on forestry on the farm, and Charles H. Dow, a director of the Letchworth Park and Arboretum, on forestry as an investment, while C. R. Pettis spoke on the work of the New York State Conservation Commission.

At the afternoon session there were addresses by Prof. James W. Toumey, of the Yale Forest School, on training foresters during the next decade; by F. L. Moore, president of the Empire State Forest Products Association, on lumbering during the next decade; by Dr. Henry S. Drinker, president of the American Forestry Association, on making public opinion in forestry conservation effective and by J. S. Whipple, president of the New York State Forestry Association, on what New York State needs in forestry.

The same evening L. H. Bailey, a former director of the State College of Agriculture, gave a delightfully poetic talk on forestry, and Gifford Pinchot spoke of the national movement in conservation.

The Saturday morning session was devoted to talks on State forestry in the East, by Alfred Gaskill, State Forester of New Jersey; in the Middle West, by Prof. Filibert Roth, of the University of Michigan, and by Dr. Fernow, on the requirements of the Society of American Foresters of its members. This concluded the formal meeting, but in the afternoon the visitors were entertained at the Cornell-Pennsylvania track meet, the Cornell-Princeton baseball game and by a trip up the lake to Crowbar Point, where they enjoyed a camp fire dinner.

A Beautiful Lake

Armstrong Lake, within the Beartooth national forest, Montana, is said to rival the famed Lake Louise of the Canadian Rockies. It lies at an elevation of 7,000 feet surrounded by towering mountains. A good road which can be traveled in half a day by automobile connects it with the railroad at Billings. A rustic hotel has recently been completed and many trails make the surrounding region accessible.

SHEEP RAISED ON A NATIONAL FOREST.

DRIFT FENCES FOR STOCK

IN order to control the movements of sheep and cattle grazed under permits on the national forests, the Government is constructing what are known as drift fences which facilitate the counting and handling of the animals. These fences also help to regulate the time when stock may enter the forests, so that sheep and cattle can be kept off in the early spring until the young grass and other forage plants have had a chance to get a start. In some cases, too, they restrict grazing to certain areas and serve either to protect some grazing grounds or to secure a complete utilization of the forage on others.

The drift fences are not enclosures but generally extend for long distances across the country, much like the "drift fences," or snow fences along railroad rights of way. The railroad fences, however, take their name from the fact that they serve to pile the wind-blown snow to the windward side of the track, so it will not settle in the cuts and impede traffic. The drift fences for stock keep the animals from going in certain directions, or "drifting," to use a cattleman's expression, or restrict them to specified areas for the winter and to others for the summer. They may also prevent stock from grazing upon areas where poisonous plants are found; thus they lessen the cost of herding and prevent losses.

Examples of the use of drift fences are furnished in several built on the Dixie forest of Utah, where stock grazing is important. Five miles of drift fences were built by the Government on this forest to protect the water supply of the city of St. George from contamination by forest range cattle. This, with other stretches of substantial wire fence in connection with rocky ledges, which are equally good barriers against stock, makes the southern boundary of one of the divisions of this forest stock proof, except at certain established gateways. During the coming year sixteen miles of fence is to be built across the northern part of this division. This will distinctly separate the northern range from that to the south, which is on an average some 3,000 feet higher and will be used exclusively as summer range. By keeping the stock on the

A Sheep Range on a Colorado National Forest.

CATTLE GRAZING ON A NATIONAL FOREST.

separate areas until the forage on the other has had a chance to start, both winter and summer range will be greatly improved and their carrying capacity increased.

Another interesting development is 4½ miles of drift fence on the Fishlake forest in the same state. It was built to keep cattle on the north side and horses on the south where larkspur grows in abundance. Larkspur is very poisonous to cattle, but is not eaten at all by horses. Before this fence was built, 60 cattle had died in one month, June; after it was built and the cattle were excluded from the larkspur areas there was a further loss of only 5, though July and August are considered by cattlemen in Utah the worst months for larkspur poisoning. Forest officers therefore have estimated that this fence, which cost $740, saved $2,500 in the first year it was built, and should save $4,000, or five times its cost, each season. It is said, too, that it increases the carrying capacity of the grazing district about 15 per cent.

Two other fences in the same state, costing $2,100, will, on a conservative estimate by the cattlemen, save approximately $6,000 a year.

In certain areas where the fences will greatly minimize the problems of the forest officers in handling cattle within the national forests, the cost is borne by the Government. In other areas where the benefits to stockmen have been shown they are built in cooperation with the cattle owners, who pay a large part of the expense or furnish the labor. Throughout the national forest states there are cattle and sheep owners' associations which represent individuals who graze their flocks and herds upon the national forests. All differences which arise between the forest officers and the individual owners are submitted to the advisory boards of these associations, and they are therefore clearing houses for the settlement of any difficulties which may need adjustment. According to the officials of the service, these associations have practically eliminated controversies, and the officers who administer them are in perfect accord with the policies of the Government. One of the evidences of this is shown in the drift fences which help both sides.

GRAZING FOR ELEVEN MILLION

LIVESTOCK INCREASES ON NATIONAL FORESTS

FIGURES showing the number of livestock for which the Secretary of Agriculture has authorized grazing permits for the ranges on the 160 National Forests during the year 1914 have just been made public. Nearly eleven million animals can be grazed, including nearly two million head of cattle and horses, nearly nine million head of sheep and goats, and about sixty-five thousand hogs. This means an increase for the current year of about thirty-eight thousand more cattle and horses, and three hundred and forty-seven thousand more sheep and goats, although the gross area of the National Forests at the beginning of 1914 is almost a million acres less than at the beginning of 1913.

During 1913, according to the reports just compiled, more than twenty-seven thousand stockmen paid the Government for grazing permits on the National Forests.

For several years past the carrying capacity of the National Forest ranges has been slowly rising, which, forest officers say, indicates an improvement in general grazing conditions and a better utilization of the forage resources. They claim that this is due mainly to the enforcement of better methods of distributing and handling stock.

On the lands recently acquired by the Federal Government within the Appalachian region of the east, regulated

grazing has been undertaken this year on six distinct areas. The local stock owners who had previously used the land under lease from the former owners have readily accepted the change of ownership and appear to be favorably impressed with the methods employed by the Forest Service for grazing purposes. While the number of all animals authorized to graze upon these southern Appalachian forests is not large, it is the belief of the forest officers in charge of them that under careful supervision the lands will support more stock than they have in the past and that there will be considerable improvement in the individual animals, with a constant increase in meat production.

FIRES CAUSED BY LIGHTNING

EXHAUSTIVE inquiry has established the fact that lightning ranks next to railroads as a source of forest fires. Forest officers say that the increasing care with fire on the part of the railroads and the public generally tends to make lightning the largest single contributing cause.

This statement represents a change of view from that held less than a decade ago in this country, when forest journals gravely argued whether lightning caused forest fires, though it was known that trees were the objects most often struck. Trees are said to be oftenest struck simply because they are so numerous, and extending upward, they shorten the distance between the ground and the clouds; further, their branches in the air and roots well into the earth invite electrical discharges.

While certain trees are said to invite lightning, and others to be immune from stroke, it seems to be a fact that any kind of tree will be struck, and the most numerous tree species in any locality is the one most likely to suffer.

Other things being equal, lightning seeks the tallest tree, or an isolated tree, or one on high ground. A deep-rooted tree is a better conductor than a shallow-rooted one, and a tree full of sap, or wet with rain, is of course a better conductor than a dry one.

Lightning sets fires by igniting the tree itself, particularly when it is dead, or partly decayed and punky, or by igniting the dry humus or duff at its base. The forest soil, when dried out, ignites readily, because it is made of partly decayed twigs and leaves, and it can hold a smouldering fire for a considerable period. It is probable that most of the lightning-set fires start in the duff.

In the mountains of southern California, Arizona, and New Mexico there are likely to be each year a number of electrical disturbances known as "dry thunder storms." They come at the end of the long dry season, and being unaccompanied by rain, are very likely to start many serious fires. For this reason the Forest Service has to keep up its maximum fire-fighting strength in those regions until the rains are fully established. In the plans and organization for fire fighting the service aims particularly to catch these unpreventable lightning-set fires at the time they start.

Planting 858,000 Trees

More than 858,000 young trees are being set out this spring on national forests in Utah and southern Idaho, and the season is reported as particularly favorable to their successful growth.

HALF OF EACH TREE LOST

HALF, or more than half, of each tree is lost in the various stages of manufacture leading to the finished commodities made from it, is the conclusion reached in a report on the wood-using industries of New York State by John T. Harris, of the United States Forest Service, in cooperation with the New York State College of Forestry at Syracuse and published by that institution. This conclusion emphasizes the finding that closer utilization of the forest products is today the greatest problem of the wood-using industries and is of vital importance.

Fifty years ago, when New York led all States in the production of lumber, the report says the problem of waste was almost unknown. At that time the one aim of the superintendent of a plant was to increase the daily output. Today, New York has dropped to twenty-third place among the lumber producing States, and there is increasing need for more efficient consumption of wood material going through the factory. The rapid decline of New York as a leader in lumber production has been accompanied by a relative increase in the demand for forest products. While her annual lumber production is at present over 25,000,000 feet her own forests and woodlots contribute less than one-third of the raw material consumed by her factories.

No problems before the State are more important than the study of closer utilization of forest products, care of the forests, forest fire protection, and reforestation. Of the 34,000,000 acres in the State, 22,000,000 are included in farms and of this, only 15,000,000 acres are actually in crops. This means that 7,000,000 acres of farms are idle; and it is estimated that less than half of the 12,000,000 acres outside of farms, contains merchantable timber. To obtain the most use from all land whatsoever, it is reliably estimated that between 12,000,000 and 14,000,000 acres in the State must eventually be devoted entirely to forests. Such an area is greater than that of Massachusetts, Connecticut, and Rhode Island combined, and is equal to all that part of New York north of the New York Central Line.

Improved forest conditions in this large area would mean an enormous saving to the State. Transportation of raw material from the extreme Southern States, from Canada, and from the West to supply factories in a forest State results of course in duplication and adds to the cost of forest products. Last year there were sent out through the ports of New York State over $15,000,000 for wood to be used in local New York industries. Practically all of the orders for this imported material should ultimately be cancelled. Twelve million acres or more of forest lands in this State should produce all of the 1,754,519,217 feet consumed by the home wood users. If New York will adopt a sound forest policy she can eventually take her former rank as one of the first States in the production of forest products and supply nearly all of the raw material needed by her factories.

The rapid increase in manufacturing in New York has made an abnormal demand for forest products and a consequent influx of timber from Canada, from the Lake States, and from the southern pine region. Douglas fir also has been shipped entirely across the continent for buildings, bridges, car construction and ship masts. Millions of feet of cypress are shipped all the way from the Gulf States to build tanks and silos; red gum from the lower Mississippi Valley is shipped in for interior finish, taking the places formerly occupied by home-grown oaks, maples and birches; practically all of the better grades of white pine used in the State comes from the Ottawa River District in Canada and from the Lake States. The Pacific Coast is called upon to

Photo by Hugh P. Baker.

BEST TYPE OF VIRGIN FOREST IN THE CENTRAL APPALACHIAN REGION.

MIXED EVERGREENS AND HARDWOODS. UNUSUALLY FINE SPECIMENS OF CUCUMBER TREE IN MIDDLE GROUND.

Photo by Hugh P. Baker.

TYPICAL SCENE IN THE BLACK FOREST OF WESTERN GERMANY.

The Black Forest covers a low mountainous region much like the Adirondacks with many of the same difficulties as to accessibility and market and yet the forest there is managed under the selection system and reproduced by natural means. It is producing as high as $2 to $4 per acre per year. Note the large number of stems per acre in comparison with the small number of stems as seen in typical virgin forests of New York.

Photo by W. C. Shepard. AT WORK IN THE WOODS.

The portable saw mill promises to be an important factor in the utilization of future forests in New York. There is really a very large amount of valuable timber standing in woodlots in New York and proper cutting of these woodlots combined with cooperative marketing of products will give farmers and land owners very excellent returns from their hill and ridge lands. It is to be hoped that the use of the portable mill will be developed and that market conditions may be improved by cooperation on the part of woodlot owners.

supply millions of shingles for buildings in New York. The western red cedar is so valuable for shingles that it has practically no competition from the home-grown woods.

Many of the most important wood-using industries of the State, including the manufacturers of planing mill products, boxes and crates, sash, doors, blinds and general millwork, furniture, cars, ships, boats, pianos and organs, get most of their raw material from abroad. The ten leading wood-using industries consume a total of 436,000,000 feet of home-grown wood and purchase from other States the enormous amount of 1,038,000,000 feet. New York's forests and woodlots still contribute to wood-using industries over half a billion feet of lumber annually. This condition can not continue long, however, unless the State takes a more active part in the restocking and preservation of her forest areas, and unless lumbermen and manufacturers utilize the forest products more economically. Two important problems confronting State foresters will be to obtain satisfactory reproduction of the more desirable species in the shortest possible time and to increase the growth to the maximum amount which the soil and situation are capable of producing.

Substantial progress has already been made in the direction of conservation. Three and one half million acres are enclosed within the so-called "blue line." This line marks the outside boundary of the Adirondack State forest reserve. But of this area the State owns only 1,600,000 acres. Much of the land, except that recently purchased, has been cut or burned over. Improved facilities for fire protection have been recently established. Additional observation towers for locating fires have been built and telephone lines extended. Excellent work has been done by the New York State Conservation Commission in the matter of reforestation of burned and cut-over lands; and while the amount of planting to date is in the aggregate small, it is a splendid start in the right direction. From two to three cents only per acre are now being expended in the Adirondacks for fire protection. It would be good economy for the State to expend two to three times this amount. Large timber owners in the Northwest spend as high as four to five cents per acre and New York can not afford to spend less.

New York is especially favored among the States climatically and otherwise for the production of forests. Favorable conditions of rainfall and soil for splendid forest development exist throughout the State. It is now known that every acre in the forest areas, where there is any soil whatever, will ultimately produce good forests. There is no reason why the Adirondacks should not eventually be covered with as fine a forest as can now be found anywhere in the Black Forest or other forest regions in Europe. Again, market conditions are unexcelled. The forest sections of the State are well equipped with streams and are easily accessible by rail.

Several suggestions have been made for the protection and proper use of the State's natural resources. These are (1) the repeal of the Constitutional provision forbidding the cutting of trees upon State lands, (2) opening of State forests for recreation places for all the people, (3) an increase of the State's holdings of forest lands, (4) extension of the present system of protection, and (5) the introduction of practical economic methods of reproduction.

Seeking Instruction Here

Zentaro Kawase, professor of forestry at the Imperial University of Tokio, Japan, has been making a tour of the national forests of this country to learn the government's methods of selling timber and of reforestation.

RUSSIA'S FOREST FAMINE

MANY people hold the popular belief that Russia is a country of limitless forests, and the fact that there is a wood famine there may shock them. Such a shock, however, is beneficial as it should awaken in them an appreciation of the efforts being made to perpetuate the forests of this country. The Russian wood famine is so severe that even Moscow suffered from it last winter and a number of public and charitable institutions were insufficiently heated.

Mr. Menshikov tells about the conditions in an article in the St. Petersburg *Novoye Vremya* and the following portions have been translated by *The Literary Digest:*

"For many years, for whole decades, we took no notice of the destruction of the forests. On the contrary, the ruling class, the nobility, hastened to sell out their wooded properties rather than be compelled to sell the land. Those who sold their forests usually did so for trifling sums, giving the brokers an opportunity of earning 300, 500, and even 1,000 per cent on their capital. Those who did not sell their own encouraged the destruction of their neighbors' forests, wisely supposing that the remaining ones would rise in price. In the end the deforestation of the country assumed threatening proportions, and when the clamor raised by the press and learned bodies and chiefly by the landed proprietors themselves became unbearable, the Government introduced a forest-conservation law. But, like the majority of our laws, the conservation was left to the will of God. With the shrewdness of the brokers and the dishonesty of the common citizen, for centuries trained in the art of circumventing the law, forest conservation has in many places been turned into an amusing comedy. The destruction of the forests, even now, goes on in full blast, and the most important of elements which guard the very possibility of man's existence in the North — the forests which yield fuel—are rapidly disappearing. What would you say if the English should be deprived of the sea, or Switzerland of her mountains? You would say that their end had come. And fire-wood must be considered just as vitally necessary to Russia as the sea is to the English and the mountains to Switzerland. One may regret the disappearance of timber, but that can in a large degree be replaced by brick, iron, and other construction materials. But fuel in the north, in the form of fire-wood, cannot be replaced. . . .

"We take a paper view of the country, and seeing on paper millions of acres of woodland, we feel quite at ease; we have been and still are the richest country in wood. This may be true, but then our forests have remained only in the north. . . . The whole western Russia, recently covered with immense forests, the central provinces, are completely bared; and even such regions as Novgorod, Olonetzk, Vologda, are being gradually affected. The forests which covered Russia were her natural cloak, serving to warm the people and rendering it possible for them to live in the North. Before our very eyes Russia's cloak is being removed these last fifty years, and our nation remains naked in the midst of a frozen desert. There is a great demand for timber and fire-wood both in Russia and abroad. . . . Speculation in forest land goes on wherever there has remained a shred of the past riches. The conservation laws are being evaded with the greatest care."

Mr. Menshikov concludes with the following burst of pessimistic but patriotic eloquence, whose bitterness seems completely justified by the condition he describes:

"Devoid of its wooded cover, the soil is losing its moisture, the lakes and rivers are drying up; from under the surface barren sands appear, and man,

deprived of fuel, deprived of the products of the natural garden of God, must either degenerate, like the Siberian savages, or flee from Russia. Our nation does both. It degenerates, or more correctly, freezes like a southern plant brought to the north, and those who are more resolute flee from their fatherland to Siberia, Turkestan, Canada, Australia, Argentina."

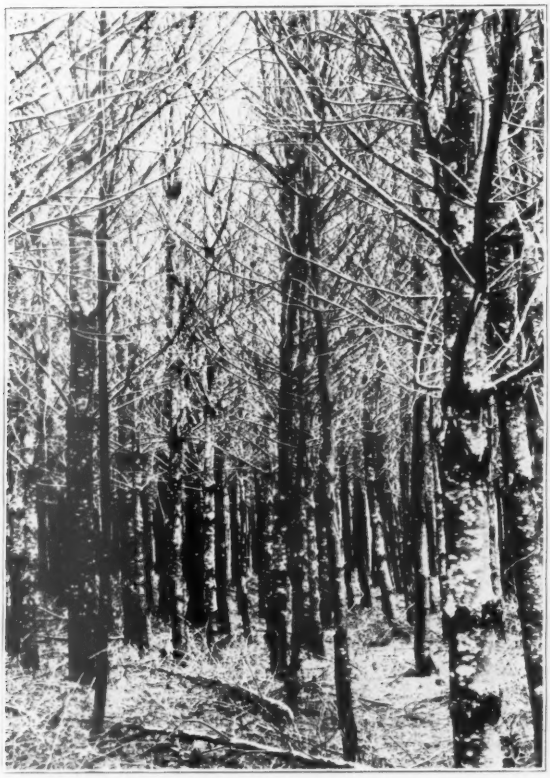
WHITE PINES MENACED

THE white-pine blister rust has such dangerous possibilities for the native white-pine forests of the East that the United States Department of Agriculture recommends earnestly that all trees found affected by this disease be destroyed at once. The disease is most conspicuous during the month of May, and it is recommended that the owners of all white pines which are not definitely known to have grown from seed in their present location make a thorough search of their white pines for this disease. The latter part of May is the best time to search for it in Northern New England and New York, while the first half of May is best for Southern New England and New York and farther south.

The disease appears upon white pines in most localities during the month of May in the form of yellow blisters breaking through the bark of the main stem near the ground. These blisters, after a few days, break open and give forth great numbers of dusty, orange-yellow spores. In rare cases it occurs well up on the trunk of trees which are twenty to twenty-five years of age. A very similar disease occurs at about the same time upon the pitch pine, but it should not be confused with the white-pine blister rust, as it is a native disease which does not attack the five-needled pines. All owners of white pines, either in woodlots or in ornamental plantings, should make a special search for the blister rust of white pine on their property. In case it is believed that this disease is found, specimens should be forwarded to the Office of Investigations in Forest Pathology in the Bureau of Plant Industry, where an examination will be made, free of charge, and the best possible advice given regarding the eradication of the disease. General, active cooperation of white-pine owners will do much to make effective the efforts of the Department to eradicate this serious enemy of the most important coniferous tree of the East.

It is estimated that at the present time there are present in this country over two and one-half million young white pine trees which were infected by this disease before they left Europe, and which are now present in this country. This disease has an alternate stage of development upon the leaves of various currants and gooseberries. It has been found a number of times in this country occurring upon currants. These occurrences of the disease upon currants in this country are directly traceable to neighboring diseased white pines, as the disease is quite definitely known now not to be carried upon dormant currant stock.

Since the discovery of this disease in 1909, a special effort has been made by various forestry officials and horticultural inspectors of the Eastern States, where the infected imported trees were mostly distributed, to eradicate the disease everywhere that it might be found. It very often occurs in ornamental plantings of private estates, especially upon trees less than twenty-five years of age. The disease is one from which the tree never recovers, so far as now known; hence it is of no advantage to the owner of diseased trees to refuse to remove and destroy the diseased trees.



PLANTED WHITE PINE, SHOWING DOMINANT AND SUPPRESSED TREES.

The disease has not yet attacked any of our forests, and if everyone who owns white pines which were brought from some other locality and planted would make a thorough search as above requested, a great step would be taken toward the eradication of this dangerous disease.

BOY SCOUTS TRAIL BUILDING

THE United States Government, always desiring to educate the public on the subject of the proper use and protection of forests, has found a means to cooperate in a practical way with the Boy Scouts of America. Through arrangements made by the United States Forestry Service, twenty-four Boy Scouts—eight from Washington, D. C., eight from Baltimore, and eight from Boston—are to build this coming summer a ten-mile trail in a remote part of the White Mountain National Forest. The plans for this work and the unusual opportunity it provides for these boys to practice their Scoutcraft and learn something about forestry, and for the government to make more intelligent and vital the interest of boys in practical conservation, are described by Forest Inspector K. W. Woodward, of the United States Forestry Service, in an article which appears, with illustrations, in the June number of *Boys' Life*, the Boy Scouts Magazine. Mr. Woodward says:

"Twenty-four Boy Scouts under the direction of three Scout Masters will build ten miles of trail for the United States Forest Service in the White Mountain National Forest this summer. In return for this work the Boy Scouts will be paid at a rate equivalent to that which the Government would have to pay for the construction of this trail were the work done by the regular force.

"TO CAMP IN THE VALLEY OF WILD RIVER.

"The trail which the Boy Scouts will build is intended primarily as a means of protection against fire. However, it will also be useful in making the White Mountian National Forest more accessible to tourists and prospective timber purchasers, and parts of it may even be used later on in the logging of the timber through which it passes.

"The boys will be working approximately ten miles from the nearest town, which is Gilead, Me. They will camp in the valley of Wild River, a tributary of the Androscoggin River, and will have two stretches of trail to build.

"The first will be alongside of Wild River and the work will consist merely in the improvement of a rough trail, which needs to be put into condition so that horses can travel over it.

"The second stretch of trail will be located in the timber, where no means of quick travel existed before.

"A PICTURESQUE COUNTRY.

"It is unnecessary to state that the region in which the boys will work, the White Mountains, possesses many scenic attractions. Immediately west of the Wild River Valley is the Carter Moriah Range, which rises abruptly to a height of 5,000 feet. Ten miles west of the boys' camp, as the crow flies, is the summit of the Presidential Range, with Mt. Washington, the highest peak in the White Mountains, standing 6,300 feet above sea level.

"The main stream to which Wild River and the other minor streams in the vicinity are tributary is the Androscoggin, which heads in Maine, flows through New Hampshire and empties into the ocean in Maine. The elevation above sea level along the valley of the Androscoggin is approximately 1,000 feet, so that the rise to three or four thousand feet from this stream to the heights of the high mountains produces very rugged topography. In fact, the greater part of this locality is so steep and rugged that agriculture is of minor importance.

"The forest resources are the main assets. Lumbering is the principal industry, with the business of providing for tourists who are attracted by the mountain scenery second in importance.

"Since the region has been settled for more than 150 years and is one of considerable wealth, many good roads make nearly all parts accessible. Where the topography is so rugged that roads are

too expensive to build, numerous trails make it possible to reach on foot even the steepest mountain peaks.

"WILL SEE WILD ANIMALS.

"As might be supposed from the large area of wild land, this is a region in which the hunting and fishing are very good. However, the Boy Scouts will not be able to do either because they will be at work during the closed season, when it is not legal to hunt or fish for the principal game and food animals. Nevertheless, they may be able to see in the course of their work deer, bear, porcupines, grouse and possibly even wild cats and wolves.

"About the only pest which will detract from the pleasure of life in the mountains will be the mosquitoes. However, mosquitoes are not very numerous.

"TO BEGIN IN JUNE.

"The Boy Scouts will be expected to report to Gorham, N. H., as soon after June 18 as possible. Gorham is the headquarters of the White Mountain National Forest, and from there a train can be taken to Gilead, Me., whence the rest of the journey must be made either with a wagon or on foot. Last summer the Forest Service constructed on the old railroad right of way running up Wild River a road which makes it possible to get about seven miles up into the woods from Gilead. However, this will not be far enough for the Boy Scout camp, so the further distance will have to be covered either by horses or the camp equipment will have to be packed on men's backs.

"Luckily, there is no lack of good drinking water in this locality, and it will not be difficult to find a good camp site close to the work. The sleeping tents and cooking tent can be set up in a circle as far back in the woods as it is feasible to bring in supplies. The nearest postoffice, Hastings, Me., is about six miles away.

"The trail work itself will consist in clearing out the brush, grading the tread of the trail and building the necessary culverts and bridges. In cases where rock needs to be broken up the Forest Officer who will have charge of this project will use dynamite. The boys will not, of course, be allowed to handle any explosives.

"TIME FOR PLAY AS WELL AS WORK.

"Since there will be about twenty-four boys and it is planned to employ them about a month, there will be ample force so the boys will not have to work more than a part of the day unless they wish to earn extra leisure in order to go on excursions to nearby points of interest. In fact, it should be possible for the boys to see all the attractive bits of scenery in the central part of the White Mountain region. The top of Mt. Washington is about fifteen miles from the camp site and can easily be reached in a day.

"THE VARIOUS ADVANTAGES.

"It is unnecessary to spend much time setting forth the good results which the boys should get out of this trip. They can practice many forms of their Scoutcraft, and will learn how to handle tools, something about forestry and a large measure of self-control. On the part of the Forest Service this departure from the usual method of building trails should also be of advantage because it will bring a large number of intelligent boys into direct contact with the work of the Service. This should help a great deal in educating the boys and their relatives and friends to the work which is being done in conserving the timber resources of the country.

FORESTRY ON THE COUNTRY ESTATE

By WARREN H. MILLER, *M. F.*

V. GETTING ACQUAINTED

IN SPITE of the fact that we have a number of excellent tree books, some of them localized entirely to the trees found east of the Mississippi, it is a fact that there are so many species to be treated with in these geographical limits that the author has but little space to spare beyond giving identification specifics and a brief mention of the qualities of the wood and the geographical limitations of the species mentioned. Most of these identification characteristics are excellent, and are backed up with superb photographs showing leaves, buds, flowers, bark, trunk and fruit of the tree, or else equally splendid hand drawings; but after all has been said and done, you have but the identification of your tree, you know what he is beyond a doubt, and a few meager facts concerning him—and that is all.

For the forest owner that is not enough. He wants to know something of its light and soil requirements, its rate of growth, when it comes in the spring and its autumn coloration in the fall, whether it has any especial characteristics to warrant saving it in case a clearing or thinning is decided upon, and finally its commercial value, either as lumber or as a source of other forest wealth. Obviously, all this information cannot be crowded within the covers of a volume identifying some three hundred species of trees growing east of the Mississippi in the United States, so it seemed to the writer that the only course in the series of papers would be to concentrate upon some forty-five species distributed fairly evenly over such an area as would contain most of the temperate zone United States species east of the Mississippi, as it is within these limits that most of the forest estates and country place woodlots are found.

Let us get a little better acquainted with our oaks, our maples, birches, hickories, our elms and our more common evergreens, and let the rest go, assuming that the reader already has one or more good identification books in his library and is able from them to recognize any tree on his place. We will take ten oaks, three maples, two ashes, four birches, two elms, seven miscellaneous broadleaves, six pines, three spruces, two cedars, the balsam fir and the hemlock and see what facts of use to the forest estate owner can be assembled concerning them.

As the oaks are the most numerous and interesting of the broadleaves, we will begin with the ten selected, although almost any forest in any section of the country can show more than ten species of oaks. The family seems to be divided into two groups of cousins, the bristly and pointed leaved ones headed by the Red Oak; and the round-leaved, with the fine old White Oak as the eldest brother.

The family difference seems further accentuated by the fact that all the white oak tribe ripen their acorns the first season and sprout them that same year if possible, while the red oak party ripen theirs the second season after flowering. Further, all the second season oaks have coarse-grained comparatively weak wood which rots quickly next the ground, and the first season oaks have a close-grained, strong, durable wood, some of them like the post oak being so immune from rot that they are named and chosen for fence-post work. As this differentiation is quite general throughout the oak family, it is almost a cast-iron rule that if you come upon one of the red oak group in your forest it cannot be

Corner of A Country Estate.

OAKS AND BIRCHES IN PROFUSION MAKE THIS ONE OF THE MOST CHARMING BITS OF FORESTED LAND ON A COUNTRY ESTATE WHERE THE OWNER DEVOTES SANE ATTENTION TO FORESTRY.

counted on for fence posts, underpinning, mudsills, dam timbers, and the like.

I once knew a young electrical engineer who did not know or else disregarded this rule. There was a fine stand of pin oaks and red oaks growing on his company's property, all straight columnar trees and all of a height. The land had to be cleared for buildings, why not utilize these trees for the electric light and telephone poles of the plant? The older linemen shook their heads, declaring that these trees would soon rot and would be hard to climb as poles, but it looked like a bargain to find three or four hundred fine telegraph poles already growing on the company's property, so they were all cut down and carefully trimmed, peeled, painted, and tarred for seven feet up from the butt. They then went up as the works electric light and power telephone poles, but within three years from that date every one of them had rotted through just above the base and they all had to come out. As the labor of line work on heavy-power wiring far exceeds the pole cost expense, a little practical forestry knowledge would have saved that engineer a lot of needless expenditure!

In these two groups then, we would assemble, behind the white oak, the swamp white oak, post oak, burr oak, and chestnut oak, while behind the red oak would gather the pin oak, scarlet, black, scrub and black jack. Taking the white oak family first, the head of the clan, the white oak grows throughout the range limits described in our article and is almost universal in its soil tastes. It succeeds admirably in moist, sandy loams, even if swampy part of the year; it does equally well on clay base, limestone base and granite base soils and prefers, in any of these bases, rich, well-drained ravine banks or creek bottoms where the spring freshets bring down quantities of silt. It will not thrive in poor or dry soils of any kind, nor in northerly latitudes where its September fall of acorns gets no chance to sprout due to the early winter. If the

Fig. 64.—Pin Oak. (Q. palustris, D. Roi.)

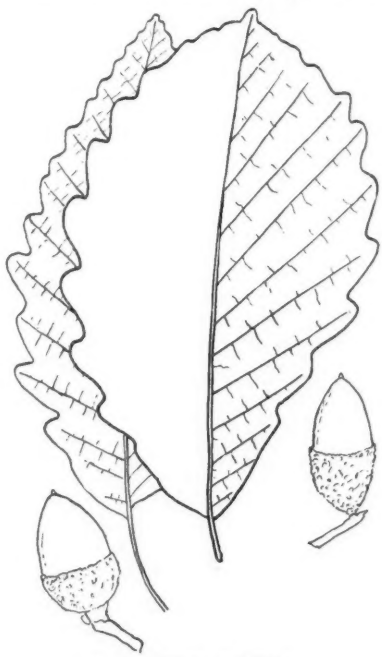


Fig. 57.—Chestnut Oak. (Q. prinus, L.)

gray squirrel is in reasonable abundance, that is, has not been shot out, the white oak will manage even as far north as southern Maine, since the squirrel plants many an acorn which otherwise would get eaten if left on the forest floor over winter. In all the southerly part of its range where the fall comes late and mild winter keeps up until December, the white oak acorns sprout and make quite a growth during the Indian Summer days, and when it is time for its leaves to turn

Fig. 55.—Burr Oak. (Q. macrocárpa, Michx.)

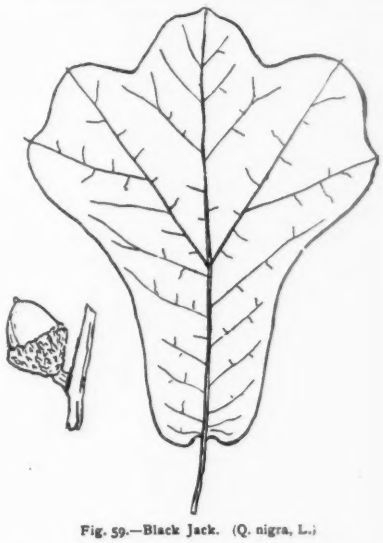


Fig. 59.—Black Jack. (Q. nigra, L.)

copper and purple and finally a light yellow brown hanging on all winter, the little seedling has four leaves to show, all of which go through the same changes as the parent tree. In its light requirements the white oak is fairly tolerant at first, but by the tenth year it must have sun for at least part of the time, and after that it must not be overtopped or it will languish. It does not stand transplanting at all from one site in the forest to another, except during its first year, and a nursery specimen, well root-pruned, must be taken when it is 6 to 7 feet high if it is expected to live in its new place.

In the writer's forest Nature has been exceedingly generous with her white oaks, and it is our predominating tree, reaching twelve inches in diameter before its fiftieth year, but in many localities it occurs much less frequently and should be reinforced by nursery specimens at salient points, the cost being about $1.25 per 7-foot tree. If many are wanted it will pay to run a seed bed of them, transplanting the first year. It is a strikingly handsome tree, both as to bark and foliage, and its color phases are always pleasing. Along about the first of May appear the pretty pink leaf buds, and early in June out come the sap-green catkins which are its flowers. These turn brown in time and drop off and we have a tiny green acorn in being. By September these are in big clusters of large green acorns which turn light yellow and then brown as they fall to the forest floor. Meanwhile the leaves have turned wonderful shades of pale copper and purple about the middle of October, changing to russet brown in November. This passes to a pale yellow-brown during the winter for the leaves hang on all through the snow season, that is a large part of them do, enough to give a fine note of color on a winter landscape, and they are finally pushed off by the oncoming spring buds. Such is the year's calendar for the white oak, always a favorite,

always a joy to the eye; and for my part I can not have too many of them!

Its first cousin, the swamp white oak, is quite different in its habits. You will find it along stream and lake banks, in rich creek bottoms—anywhere where it is never really dry—occurring throughout the northern half of our area. It is as much a characteristic of low-ground, water-inundated landscapes as the red and silver maples, the king nut hickory, the gums and ashes, and the pin oak. So far as I know, nurserymen have not attempted to grow it, but, as it will be an excellent sort to plant where one has cleared some bottom land of trash and thickets, it will be well to grow some of its acorns in the seed bed, for it stands transplanting nicely and will yield you a fine timber classed right in with white oak. It is not a pretty tree, for its leaves turn direct to brown yellow in the autumn and its branchlets sweep downward in dense masses, giving the tree a shaggy appearance. The bark is dark, in deep, rough, regular seams.

Fig. 61.—Scarlet Oak. (Q. coccinea, Wang.)

The post oak, second cousin of the white, is easily told from it by its deeply indented leaves, the leaf having a distinct waist so to speak, and its acorn is smaller and rounder with the cup enclosing half of the acorn, growing sessile in pairs on the twigs, while the swamp white oak acorns have a long stem, though its acorn closely resembles the white oak's which has no stem. So there you have an easily remembered identification, even though certain freaks among the leaves may be enough alike to deceive one. The burr oak, next in line among the white oak cousins, is the principal western representative in its favorite location of rich moist bottom lands. We do not see many of them here in the east, but in the Ohio and Wabash basins it is common, a magnificent tree, of wood equal to the white oak in commercial qualities. Its leaf looks like a cross between the post oak and the white, having the deep indentations of the post and the numerous lobes of the white. They have a handsome, glossy-green appear-

Fig. 63.—Red Oak. (Q. rubra, L.)

ance in summer and go direct to brown in autumn. The acorns are large and three-quarters enclosed by a deep cut, with a fringe around the top. An interesting member of the family, and one or two of them at least should find a place in your ravines, grown from the acorn as they are difficult to transplant.

On your high and dry ridges, preferably sandy base soil, you have the star locality for the fifth of the white oak cousins, the chestnut oak,—rather far

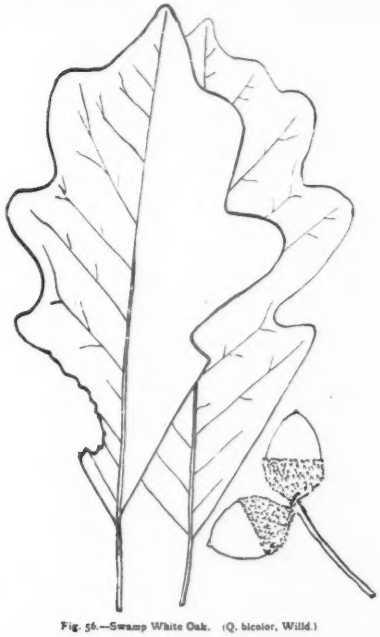


Fig. 56.—Swamp White Oak. (Q. bicolor, Willd.)

removed as it verges closely on the chestnut itself in its characteristics, but is one of the first-year acorn group, with wood of the same characteristics as the rest of the family. There are two species, the rock chestnut, a rather small tree with huge glossy dark green leaves reaching fourteen inches in length and huge oval acorns and the scrub chestnut oak, of lighter bark and smaller leaf and acorn, though with us it grows to very large size on sand base, its preferred soil. The rock chestnut does best on a clay base, and very well on limestone and granite. It is not at all tolerant of shade, and its big leaves enable it to fight vigorously for light, suppressing anything else growing near it and making the most of its trim economical space. This tree only occurs in the eastern part of our area, seldom west of Ohio, probably due to its insistence on hill sides for growing room. I do not see it offered in many nurserymen's catalogues, yet it is one of the easiest transplanted of the oaks and should make a good summer feature for landscape work. It goes right to brown in the fall, and its leaves are soon down, so I should hardly care to spend money upon it when there are so

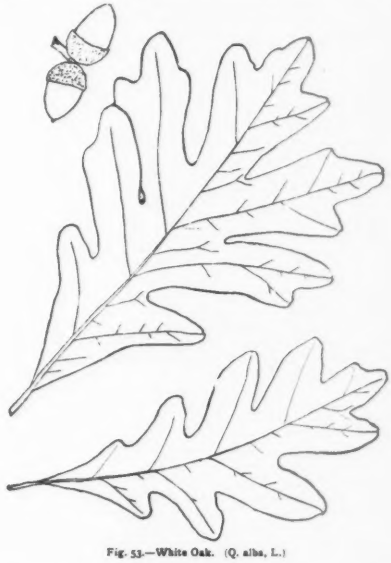


Fig. 53.—White Oak. (Q. alba, L.)

many more ornamental trees for year-round beauty that need room.

As to the dressed appearance of the woods of these five oaks, it would almost take an expert mill man to tell the species apart. Chestnut, burr, post, and white, all show a flower in the quartering, the post oak flower being in narrow parallel lines while the others are wavy and irregular. Swamp white has no flower at all in the quarter grain. Looking at the end of the log, the colors vary from light heart wood in burr, post, and white, to dark in chestnut and swamp white. Planed lengthwise of the grain,

the white shows the closest fibre lines, swamp white more open and broader, and post and burr oak smooth and light with the fibre patterns far apart and hardly distinguishable. In planing any such wood along the grain one is bound to cross the fibre ends on a long slant, leaving rows of what looks like pin-pricks but are the fibre ends crossing the cut at a slant. The straighter the fibres the fewer of these patterns of fibre ends crossed by the plane from which we note that the oak sap fibres vary in straightness from post oak to white oak in a decreasing scale, through this series of five first-year oaks.

We now take up the second branch of the oak clan, the second season oaks ripening their oaks the second year and have chosen five representatives out of the many—the red, black, pin, scarlet and black jack oaks. Except for the last, all of them are characterized by a pointed-lobed leaf, often with the ribs extended like tiny umbrella points to form a bristle at the tip of each projection. Two of them, the scarlet and the pin oaks are favorite nurserymen's oaks, for they color brilliantly in the fall and their graceful feathery foliage is a pleasure to the eye all through the summer. Owing to the pin oak's preference for low, swampy soils, it does not get to bud until late in the spring, usually about the fifth of May.

The red and black oaks, while handsome in summer because of their abundant, glossy dark-green leaves, are not to be relied upon in the autumn, as the red goes right to a dull brown and the leaves fall by the end of October, while the black turns to a deep, dull, reddish-purple and then yellow-brown, which persist all winter from some of the twigs, helping out the white oaks and the beeches to make the winter snowscapes cheerful. As none of these oaks are particularly valuable for their wood, their ornamental considerations would weigh heavily when in doubt as to which to take out and which to leave. For instance, of a clump of scarlet, black and red oaks that had to be would remain with the scarlet. As thinned, I should certainly take out the red and then the black because of the splendid note of red and orange that this would also be the case with the black and pin oaks, to a lesser degree, they would receive preference in the order named. All three are offered by nurserymen at about a dollar each for 8-ft. trees, well root-pruned, and the pin oak is the easiest of them to transplant. Their soil preferences are, for rich uplands and ridges, red and black oaks; rich, moist river bottoms, red and pin oaks; low swampy soils and rich clay base flat lands, inundated or swampy in the spring, pin oak; dry well-drained sand or limestone base soils, scarlet oak; also clay base if not too wet. For barren, sandy or rocky ridges and hills the black jack and scrub oaks are the principal representatives of the family, almost by preference it would seem, for, while the black jack will do well in company with chestnut oaks and red oaks in rich, rather dry uplands and hills bordering river banks, the scrub or bear oak must have a barren to grow in. Here they put out their stubby club-shaped leaves, scarlet and purple in the autumn, and drop myriads of tiny acorns, a small miniature or the white oak acorn, much prized by bears and wild hogs, red squirrels and wild turkeys. The blackjack goes right to a dull brown in the autumn and comes down soon after the first frosts. It has little value except for firewood, of which it makes one of the best, as its logs burn slowly with a small hot flame,—the campers delight.

Commercially, pin oaks and red and black oaks are salable as second-grade oak, used for interior trim. The wood works much easier under the saw and plane and the chisel than the white oak grades, and is reddish in color with deep abundant fibre pits. The branchlets of the pin oak are exceedingly hard and tough, and its wood was used by the early settlers for treenails in house building, whence its name pin oak, the nail or pin of the frontier dwelling when iron was scarce. Looking at the ends of the logs, there is a whole lot to be learnt in just studying the sec-

THE WHITE OAK.

tional rings. Both the red and the pin oaks show immense thick rings, not less than a quarter inch from spring wood to spring wood, showing that they are both rapid growers and uniform up to at least forty years of age, when they become more sedate. The red oak is a trifle more reddish in tinge, and in the quarter grain the pin oak surface looks almost like an ash, so deep and pronounced are the dark fibre ends. Planed along the grain, the spacing between fibre patterns is huge, 1½ to 2 inches being common. Except for hardness it would be difficult to tell the two woods apart in the lumber. With the black oak (*Q. Tinctoria*) sometimes called "yellow," and the scarlet oak, the story of the log ends is very different. Multitudes of narrow rings, scarce a sixteenth inch apart, tell of years of slow growth; the quartering shows a close grain and a pretty flower; and, planing along the grain, we get a figure much resembling chestnut. In color a deep red predominates in the scarlet oak and a pink tinge is seen in both quartering and end sections of the black oak.

Growing in forest stands the pin oak is not very impressive, being a columnar tree with quantities of small, tough hanging branchlets, but set out in a field or along a forest wall these same branches spread out until the tree

is pyramidal in shape. With its bright, green, glossy feathery leaves in summer and its glowing colors in the fall the pin oak will always be a favorite. It begins to turn about October 10th and the show lasts until November. Its acorns are small, pretty, round and striped, much prized by birds and squirrels. They do not sprout until the following spring. The black oak is rather hard to tell off-hand from the scarlet, as its leaves and acorns are very much alike. If you dig into the bark, however, with your penknife the story is soon told, for the inner bark of the black or "golden" oak is bright yellow, the best yellow dye in the woods, while the inner bark of the scarlet oak turns red upon exposure to the air. There is some difference in the acorns, too, those of the black oak being larger and more deeply covered by the cup, particularly when young, when it almost encloses the acorn completely. It is important to know which is which, for the scarlet is much the more ornamental tree though always small, while the black gives a good lumber and a reasonable fall coloration.

The red oak you cannot mistake the moment you pick up one of its acorns, for it will be large and blunt ended with a flat cup. The tree is a fast grower in its early years, and if located near a white oak will usually crowd it out and suppress it, but give both trees an equal chance at the sun, clearing the way ahead and around the white oak to make up for its less abundant leaf area and you will not find more than an inch difference in their diameters in the fiftieth year. The red oak prefers a rather dry clay or limestone base soil; we have few of them in the rich moist sandy base soils of Interlaken, but they are abundant in the red Trenton limestones further west, in the clayey river bottoms of the Middle States, and on granite base in New York. Shade enduring when young, a good fighter for light as it grows up, easily transplanted and like most of the oaks free from insect attack, the red will always hold its own and it has the better acorns of all the bristle-leaved cousins, sprouting the spring after falling, so it has not much trouble reproducing itself. It has no autumn beauty and its wood is second grade, weak and bushy, so I would always favor the white oak in preference to it when growing together, and never could see any reason for our State forest services pushing it ahead of the white oak for plantations simply because it grows much faster at first.

In our next paper we will look over the maples, hickories, ashes, elms and miscellaneous broadleaves as seen from the point of view of the man who owns them and proposes to raise more of the same kind.

(To be continued.)

EDITORIAL

SPEAKERS of the American Forestry Association will on July 9 and 10 at Chautauqua, New York, address some eight or nine thousand teachers from every State in the union, on the necessity for proper care of the forests, for promoting love of trees, for teaching the value of the woodlands for recreational purposes, and for widely diffusing the doctrine of forest conservation. This is the kind of educational work which meets with a most valuable response, as each of the eight or nine thousand will, in turn, speak to scores; and in hundreds of thousands of youthful minds will be planted a seed of thought which will develop, it is hoped, into an appreciation of the value of trees for their value to mankind.

THIS is the time of year when careful precautions against forest fires may be the means of saving millions of dollars.

The general public can aid materially in this work by taking pains, when in the woods, to quench their camp fires, to avoid throwing lighted cigar and cigarette stubs or burning matches on the ground, and by putting out, if possible, or reporting quickly, any fires which they may discover.

It should be remembered that water is not always necessary to extinguish a fire. Fires may be beaten out with sacks, coats, etc., or may be covered with fresh earth and put out.

Every boy and girl and every man and woman while in or near the woods should be a self-constituted fire warden. Carelessness is responsible for a goodly percentage of the fires, and if proper care is exercised and ordinary precautions taken, it is not difficult to make the fire losses small. Losses by all causes except lightning are practically preventable. While the railroads are a chief cause of fires, the railroads are doing much in the work of fire prevention by equipping locomotives with spark arresters, by using in heavily wooded districts oil burning locomotives which do not eject sparks, by clearing their right of way for some distance on each side of the tracks, by patrolling sections where fires are likely and by educating train crews to look for, fight and report fires.

In many sections farmers clear off brush grown lots by setting fire to the brush, and this should be done only when the wind is from a safe direction, and even then the fire should be carefully watched and all the flames should be extinguished before night comes.

Every country newspaper, in fact every publication, can be of service, in impressing people with the value of wise precautions against forest fires. Do not forget that forest fires cost an average of seventy human lives, thousands of animal lives and $25,000,000 in financial loss every year.

EARLY next year, nearly all in January, the legislatures of many States meet. If the American Forestry Association succeeds in its efforts, and there is every likelihood that it will, the legislatures in thirteen States, twelve meeting in January next and one in April next, will be asked to consider forestry laws providing for a State forestry administration, which they now lack.

In some of these States there is little forest growth but in several the forest products form a very considerable portion of the States' wealth and forest departments are vitally necessary.

The American Forestry Association is now proceeding with the campaign for arousing interest in forestry laws in these States and in showing the people just why they and the State will be benefited by the passage of such laws. If the people are interested the members of the legislatures have to be, and if the people demand forestry laws the legislators have to give such proposed laws their careful consideration.

In four States—Delaware, Louisiana, Tennessee and Alabama — there are workable forest laws, but no appropriations for making these laws effective. The duty of the American Forestry Association in these States is plain, and the Association will continue urging the legislators to provide proper appropriations until they do so.

THE annual report of the Forest Branch, Department of Lands, British Columbia, for 1913, prepared by H. R. MacMillan, gives in a very brief summarized form a glimpse of the enormous progress being made in this province in forest organization. Upon the solid foundation of retention of ownership of all timber lands bearing stands over a certain minimum per acre, which has always been the policy of Canadian provinces, MacMillan has systematized the business of administering these resources according to the best modern office methods, eliminating delays and effecting great economies. The most revolutionary change effected was the organization of eleven forest districts, whose district foresters assumed the immediate charge of all lines of field work in their respective districts, instead of having a number of separate bureaus all operating from one central office. The main lines of work have been supervision of cutting and scaling and collection of royalties on timber leases, classification of lands, and protection from fire, with the construction of permanent improvements which this necessitates. The income from all sources for the province, collected by this department, amounted in 1913 to $2,832,788, on a total expenditure of $245,754.

The effectiveness of this new field organization is manifesting itself in fire protection. The methods found so effectual in the Northwestern States are already well advanced in British Columbia. Last year 11,255 permits were issued for slash and brush burning, and but 17 fires escaped control. The department has assumed complete control of fire patrol along lines of railway construction, the expense being borne by the railroads. Slash burning after lumbering is not compulsory, but the clearing of fire lines is made so, and loggers prefer to burn all the slash rather than build fire lines.

The province shows the same far-sighted policy in land classification for agricultural use as marks the entire land policy of Canada. Touching this policy, the report states: "The policy of land classification is a most important part of land settlement. It protects a permanent source of revenue for the province by ensuring that no bodies of merchantable timber will be acquired except by public sale at a price which guards the public interest, and at the same time it protects the uninformed bona fide settler by preventing him from locating in some timbered non-agricul-

tural tract where he could not be successful." These land examinations are entirely in the hands of the agents of the Forestry Branch.

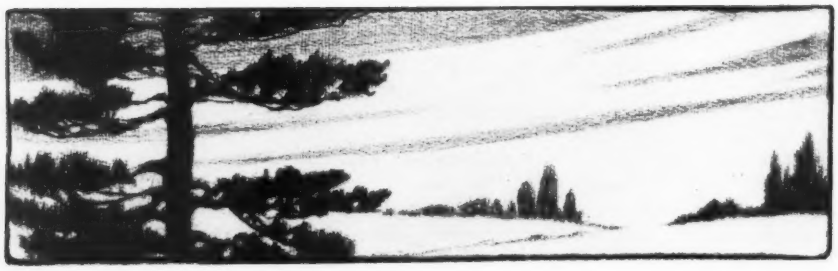
In the midst of this reorganization the service has found time to send out reconnaissance crews covering 12,308,000 acres in 1913, over little known watersheds. The enormous and undeveloped state of the timber resources of the province is shown by the fact that only 11 million acres of timber limits have been taken up, out of 245 million acres of land. The average area patrolled by a forest guard is 943,396 acres, while a ranger district averages 4,545,454 acres and in all cases exceeds one million acres, or an area as large as the average national forest in the United States. Since the government owns practically all the land and non-agricultural timber-bearing lands cannot be alienated without examination, it has been considered unnecessary at present to attempt to define and set aside forest reserves as has been done in the eastern provinces.

It would appear from this showing that MacMillan's high ideals in public service, abundant energy, and gift for organization have found a field large enough to satisfy his highest ambitions, and it may not be long before the more eastern provinces, where progress has been held in check by the iron grip of custom, and of politics, may have to look to British Columbia as a model for their own guidance in securing graft-free and progressive forest administration.

THE Post Office Department has just repeated, in the current postal guide supplement, the instructions through which rural carriers are to report forest fires to the proper authorities during the coming season. These instructions were issued in May, 1912, and during the past two years the cooperation has resulted in the detection and suppression of many fires.

State and federal forest officers will make a special effort this year to get even more value out of the service than has been obtained heretofore. The usual procedure has been for the State fire wardens or federal forest officers to send to the postmasters lists of local wardens and patrolmen, with their addresses and telephone numbers. These lists are given to the carriers with instructions to report forest fires to men whose names appear thereon, or to other responsible persons. This year a special effort will be made to follow up the sending out of the lists by having the patrolmen and wardens meet the carriers personally and to take the initiative in arranging such meetings, and also to map out a plan of action to be followed.

Cooperation between the rural carriers and the federal forest officers will be effective in the twenty States in which national forests exist and with State forest officers in the twenty States which have established their own fire protective systems. It is expected that fire services of the carriers will be particularly valuable in helping to protect the new national forest areas in the southern Appalachians.



FOREST NOTES

The first reports of forest fires have begun to come in to Washington from the national forests, and they indicate to the federal officers an early start of the fire season, with unfavorable weather conditions from the very beginning. In the northwest there was less snow on the mountains at the end of the winter than for many years past. Railroad rights of way, which were last year deep in snow, are reported clear now and dry enough to burn readily.

From the Canadian border to Mexico the reports are similar, and there have already been extensive fires in California and Arizona.

The Chief Forester reports, however, that the fire-fighting forces of the service are organized better than ever before, particularly in respect to the fire detection system of lookout stations. By means of these stations fires are reported quickly and accurately, so that the control forces may be on the ground at the earliest possible moment.

In those States where the gravest danger threatens, special efforts are being made by the government foresters and by cooperative fire protection associations organized among timberland owners, to secure care with fire on the part of campers, prospectors, loggers, and by railroads. The Northwestern Forestry and Conservation Association, with headquarters at Portland, Oregon, is one of the leaders in this campaign.

A definite relation between the amount of humus, or vegetable matter in the soil, and its crop-producing power as shown by yields of corn, is given in figures just issued by the Department of Agriculture. The department therefore advocates the use of various methods to introduce the required humus into the soil.

Experts of the forest service state that the soils of the whole country, and particularly of the South, have lost and are losing immense amounts of this source of soil fertility through forest fires which apparently do little immediate damage but rob the soil of accumulations of humus. In many parts of the South, land is being cleared for farming, and where such forest land has not been burned, there is a large percentage of vegetable matter, which provides considerable fertility, and a good texture. Moreover, this soil has a greater capacity to absorb and retain moisture, and thus is less likely to be washed and gullied under heavy rains. For these reasons, leaving out of account the damage to standing timber, the department's authorities are agreed that fire should be rigidly kept out of woodlands.

The President, upon the recommendation of Secretary Lane, has eliminated from the Toiyabe National Forest in the State of Nevada 38,306 acres of land, of which 38,079 acres is public land, the remainder having heretofore been disposed of under the public land laws.

A similar restoration has been made of 32,740 acres from the Siskiyou National Forest in the State of Oregon,

of which 15,115 acres is public land, the remainder having been heretofore disposed of under the public land laws.

The President, upon Secretary Lane's recommendation, has also signed a Proclamation enlarging the Fillmore National Forest in Utah to the extent of 91,630 acres additional. This action was taken principally in order to secure a better administrative boundary for the forest and to protect the water shed in the vicinity of the town of Beaver. The additional withdrawn land is largely surveyed and unappropriated.

The Canadian Parks Branch has just gotten out a new fire-warning notice for use in the National Parks throughout the Dominion of Canada. These have been prepared in a very striking and attractive form. Formerly such notices were prepared on cloth and were easily destroyed by the weather and not infrequently by porcupines. The new notices, however, are made of tin and the face with baked enamel. These metal notices will withstand any kind of weather and are far superior and much more durable than the old cloth notices. The initial cost is higher, but this is justified when the superior lasting qualities of the tin over that of the cloth notices is taken into account. The lettering is in red and black, sufficiently large to be easily readable at a distance. At the top of the notice is a picture of a forest fire, depicting in a vivid manner the ravage and devastating influence of fires to the timber resources of the country.

These notices have been sent out to the various Park Superintendents and will be posted up in conspicuous places throughout the National Parks.

During the month of April, 1914, a total of 206 acres of land within the Apache National Forest, Arizona, were listed with the Secretary of the Interior and will shortly be opened to entry under the Forest Homestead Act. The lands thus listed were applied for individually by two applicants, and each one of these tracts was examined by a Forest Officer and found to be more valuable for agriculture than for Forest purposes. Those whose applications within the Apache National Forest were favorably acted upon during the month of April are: H. R. Hynson, Clifton, Arizona; Amos Reamtsma, Eagar, Arizona. In addition to this, 1,329 acres were listed to applicants within other national forests in Arizona, and 1,728 acres within national forests in New Mexico.

The annual meeting of the North Carolina Forestry Association, which was unavoidably postponed from April to June, has been called to meet in Asheville on Wednesday and Thursday, June 10 and 11, 1914. The Appalachian Park Association meets on the same day, and the night session of the Forestry Convention will be held under its auspices.

The program as previously arranged will be carried out as closely as possible. The afternoon drive through the planted forests of the Biltmore Estate and the day's trip through Pisgah Forest to see lumbering under proper forestry control as practiced by the Carr Lumber Company, are still prominent and attractive features of the convention.

The courteous invitation of the Champion Fiber Company to visit their pulp mill at Canton is still open, and no doubt many delegates will avail themselves of this opportunity to see one of the largest and most interesting factories of its kind in the country.

The recently appointed members of the Forestry Committee of the National Wholesale Lumber Dealers Association are J. R. Williams, Jr., Chairman, care of J. Randall Williams & Co., Philadelphia, Pa.; E. A. Selfridge, Jr., Northwestern Redwood Co., Willitts, Cal.; J. V. Stimson, Huntingburg, Ind.; E. N. Wheeler, Wheeler & Dusenbury, Endeavor, Pa.; W. R. Butler, W. R. Butler & Co., Boston, Mass.; J. S. Gillies, Gillies Brothers' Lumber Co., Braeside, Ont.; J. B. White, Riordon Paper

Co., Ltd., Montreal, Quebec; Horton Corwin, Jr., Branning Mfg. Co., Edenton, N. C.

The Advisory Committee to represent this Association to the American Forestry Association is composed of R. C. Lippincott, Chairman, Crozer Bldg., Philadelphia, Pa.; John M. Woods, John M. Woods & Co., Boston, Mass.; R. L. Sisson, A. Sherman Lumber Company, Potsdam, N. Y.

At the request of Senator Thomas and Representative Taylor, of Colorado, the President has withdrawn from entry numerous tracts of lands lying west of the City of Denver, pending the passage of two bills in Congress, whose passage has been recommended by Secretary Lane, to extend the park plan of Denver. The purpose is to beautify these tracts for use as one of the scenic features of the city. A boulevard is to be constructed by the city to the land. The proposed legislation will add 9,000 acres to the Pike National Forest and grant 7,000 acres to the city.

Among the exhibits at the Forest Products Exposition in Chicago was one of a metal basket for the feeding of wild birds which attracted much attention from the many interested in the preservation of the birds. It was invented by Charles E. White and is intended particularly for feeding suet or other fats which are so tempting to wild birds. The basket is so arranged that it can readily be fastened to a tree and easily refilled, and it permits the birds to get their fill of the food without being able to carry away large pieces of it. It is proving most effective in coaxing wild birds to remain in localities where they are desired.

Students of the New York State College of Forestry at Syracuse during the past spring have planted as a part of their laboratory work over 100,000 forest trees; 55,000 trees were planted at Richland and Kasoag in Oswego County; 20,000 were put out on the Chittenango Forest Station at North Chittenango; 16,000 on the Salamanca Forest Station, and 12,000 were planted around the City Reservoir at Fayetteville. Thirty college boys planted 55,000 trees at Richland in a little less than three days.

Theodore S. Woolsey, Jr., one of the leading American foresters of the younger group, has a 37-page paper on "Austrian Forestry" in the last number of the "Society of American Foresters' Proceedings." This paper is finely illustrated, very complete and full of value for Americans.

Ground has just been broken for the State Forestry Building on the Campus of Syracuse University. In 1913 the State appropriated $250,000 for the State Forestry Building for the State College of Forestry, and it is expected that it will be ready for occupancy in the summer of 1915. The building when completed will be the finest Forestry building in the United States and the only building erected by any State east of the Mississippi as a State Forestry building.

A special wood rule, known as a Biltmore or Cruiser stick, is now being used extensively in government forestry work. There are four or five different styles of this stick in use, but in form most of them are similar to common flat wood rules, though some have one beveled face. They range in length from two to four feet and are made by the Lufkin Rule Co., of Saginaw, Mich. Some of them are simply adapted to determining the diameter of standing trees and some of them are so graduated that in addition to giving diameters, they can be used to estimate the height of standing trees and have also one tier of log rule figures on them, so that board contents of logs 16 feet or multiples thereof in length can be arrived at.

North Carolina is issuing separate reports of the forest resources of each

county in the State. So far, the State has already published those of the western mountainous portion, and is now getting out bulletins on the counties in the Piedmont region.

The work is being done by the forestry division of the geological and economic survey of North Carolina, and each report is a concise statement occupying less than four printed pages. It is intended by the survey that these reports of individual counties may be reprinted by the local newspapers, because in that way the specific local information will be given to the people in the cheapest and most direct way.

The Government has just offered for sale two tracts of timber on Lolo Creek within the Clearwater National Forest, Idaho, aggregating 600 million feet of saw timber and 350 thousand cedar poles, together with a considerable amount of material for piling, shingles, and posts. A large part of the timber is Idaho white pine, but the stands include yellow pine, lodgepole, spruce, western larch, Douglas fir, cedar, and white fir. The prices, which represent the lowest rates which will be considered for the saw timber, range from $3.50 for green white pine to 50 cents a thousand for Douglas fir, western larch, and cedar. The prices of poles range from 5 cents to $2.40 apiece, depending upon the size.

Full particulars may be obtained from the District Forester, at Missoula, Montana, or from the Forest Supervisor at Orofino, Idaho.

Nearly 17,000 acres have just been added by act of Congress to the Caribou National Forest, Idaho. This is one of the first of such additions through congressional action, and is the largest so far made by direct legislation.

Those who have followed the National Forest movement in this country will recall that most of the forests have been created through presidential proclamation, which set aside, for timber growing or for water protection, certain areas of the public domain. In March, 1907, however, Congress passed a law that no further additions should be made to the National Forest areas in the States of Colorado, Idaho, Montana, Oregon, Washington, and Wyoming, except through congressional action.

Since July, 1909, residents of the city of Montpelier, Idaho, have been petitioning to have this 17,000 acres added to the Caribou National Forest, because the area includes the watershed of the stream which furnishes the city's water supply. Not being within a National Forest, the tract was given over to unregulated grazing and other usages which resulted in stream pollution and became a serious menace to health. The citizens of Montpelier, at several times subsequent to their first efforts in 1909, renewed their petition; and the act just passed represents the successful outcome of their efforts.

Fire Rangers Use Steel Towers.

The steel towers that support electric power transmission lines are being increasingly used by forest rangers as fire lookout stations on national forests. With the harnessing of the mountain streams a network of these lines is gradually being woven over the forests and in the absence of other convenient lookouts, the rangers find the steel towers helpful in their fire patrol work.

New Fire Fighting Tool.

A tool used to fight fires on the California forests combines a rake, spade and hoe. It is compact so that it can be carried on horseback, and weighs less than 5½ pounds.

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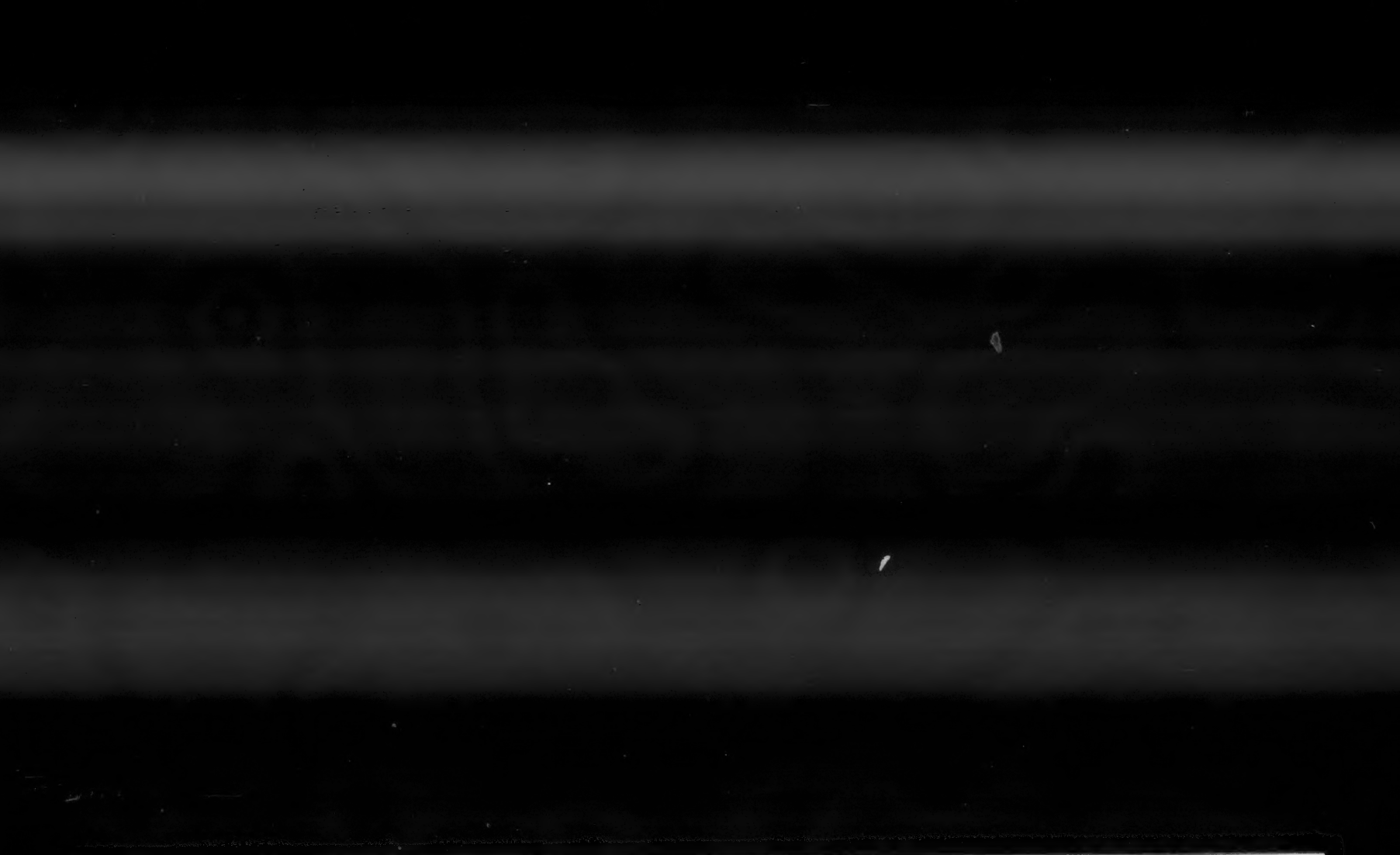
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